

# The Chemical Age

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## Some Aspects of Dermatitis

**E**ARLY in the session that has recently ended, Dr. H. E. Cox lectured to the Society of Chemistry Industry on dermatitis, and quite naturally he then stressed particularly the chemical aspect of this ailment. He has since read a paper on the forensic aspects of the subject before the Medico-Legal Society, in the course of which somewhat different considerations were discussed. Dr. Cox rightly insisted that there undoubtedly exists among manufacturers, particularly of textiles and dyes, a widespread feeling of dissatisfaction with the present or apparent state of the law, more especially in relation to idiosyncrasy and by reason of their feeling that when damages are claimed they have to pay not for any fault or negligence of their own, but for the personal peculiarities of a supersensitive individual. The chemist, the medical man, and the lawyer each have their part to play in the problem; the chemist must determine the reactions and properties of the substances he makes and that industry uses, and he must also watch their purity and the purity of the substances made from them; the medical man's task is more difficult, for he has to determine the effect of these substances on the human body where, very often, experiment is impractical and experience is the only guide; the lawyer's part is to look on and to see fair play. It is instructive to observe from the published account of Dr. Cox's lecture, how the different professions react to the problem.

Dr. Cox, speaking as a chemist, was at pains to lay the greatest stress upon the capricious nature of the disease. He shows that the incidence of fur dermatitis is of the order of 1 in 10,000, whilst with dyed textile fabrics the incidence cannot be more than 1 in 1,000,000. There are substances such as paraphenylenediamine, which are known to set up dermatitis; out of 320 cases examined by Dr. Cox just over 160 were due to this substance and a further 70 to amino-compounds of the same group. Yet the vast majority of wearers of furs do not suffer from any ill-effects. The same person may be immune at one time—perhaps for years—and then may quite suddenly become sensitive. Experience does not bear out the suggestion that there are persons who cannot wear certain dyed materials, but it has been shown that there are persons, or that some persons at certain periods in the lives, or under certain conditions, who become sensitive to minute quantities of these compounds to which the majority are insensitive. This phenomenon is even more striking with textiles than with furs, because the whole batch must have the same composition, and thousands of people may use part of the batch without any ill-effects, whereas one may develop dermatitis. A case was cited in which a minute amount of sulphite was retained by woollen garments—it being

almost impossible to remove the whole of any substance that is strongly absorbed—and 4,700,000 of these garments had been sold without complaint. The one complaint made cost the vendors £2,450. It is not surprising that Dr. Cox should argue that manufacturers should not be made to pay for the personal idiosyncrasies of the individual wearer. It is quite possible, moreover, for sensitisation to occur by reason of some other compound such as methyl heptene carbonate, perhaps used as a scent, which has been applied just before wearing the article that is blamed.

Medical evidence in general supported Dr. Cox in his conclusions upon the chemical aspect of dermatitis, but took the view that those who sell know that a proportion of those who buy must be liable to dermatitis and must take their share in the responsibility for any catastrophes that may occur, a responsibility that must be borne by their profits. The legal mind supported the present law up to a point. There is a warranty that goods shall be reasonably fit for the purpose for which they are to be used. The Sale of Goods Act, codified in 1893, has been found satisfactory, and to that extent in a general way legal opinion appeared to be against Dr. Cox. On the other hand, it is conceded that the hypersensitivity of the person has never yet been dealt with. The word "reasonably" must not be left out of the consideration, and Judge Earengay, speaking in the discussion, declared that he had some reason for thinking that if the matter were properly applied and brought before the court for a direct decision, it might be held that "reasonably fit" meant just what it says, that damages would not lie in the case of damage in a person sensitive to an extraordinary degree. As against this commonsense view of the legal liability, there is, of course, the fundamental difficulty of proving that a person is extraordinarily sensitive. So far as concerns the general public, it is almost as reasonable to declare that every person who contracts dermatitis is extraordinarily sensitive, unless it can be proved that the goods in question contained known deleterious substances in more than a reasonable and practicable quantity.

The case of industrial dermatitis is, of course, on a different footing, for the employee has no option but to use the substances supplied by his employer and to work under the conditions existing in the factory where he is employed. It is worth noting that dermatitis is frequently associated with the prevalence of a hot and humid atmosphere, and may be materially reduced by reduction of temperature and moisture, so that perspiration is evaporated. This is, of course, apart from the occasions when the continued use of certain substances has set up the disease.

## Notes and Comments

### The Harrogate Meeting

FROM the detailed programme published in another page it will be seen that the fifty-sixth annual meeting of the Society of Chemical Industry at Harrogate next week will provide members with a happy combination of business and social activities. Those who regard the annual meeting as a purely "shop" affair might think that the business and technical proceedings could have been compressed into a shorter period, but we have no doubt that the meetings, works visits and social events have been deliberately interwoven to ensure that members shall spend as long a time as possible in each other's company. The usual practice has been pursued of inviting two of the four subject groups of the Society—this year the Food Group and the Chemical Engineering Group—to hold sessions at which topics of particular concern to them are to be reviewed. It is questionable whether this practice does not militate against the presence of members of the other groups, and it might be worth while considering the possibility another year of organising sessions of more general interest, such as those that provoked so much discussion during the past winter season. The Society is fortunate in having Lord Leverhulme as its president, not only for the year that is closing, but for the coming twelve months also.

### Whale Oils

THE chemical industry cannot remain unaffected by the recent arrangements that have been made internationally for limitation of the whaling industry. The whale is, we believe, a comparatively recent entrant into the chemical industry, though we are open to correction. As a trade, whaling is ancient, and the Basques had a monopoly of it in the 13th and 14th centuries. Whale oil became useful for soap-making, etc., upon the discovery by Normann in 1902 that by hydrogenation in presence of nickel it would produce solid fats suitable for the making of margarine, soap, or candles. The technical problems were worked out and by 1908 hardened whale oil was produced by Joseph Crosfield and Sons, Ltd., to the extent of 100 or 150 tons a week. Lever Brothers, Ltd., have their own whaling stations, and they have taken a conspicuous part both in the modernisation of whaling methods and in the adaptation of whale oil to the purposes of industry. It cannot be to anyone's advantage that wholesale slaughter should cause the whale to disappear, and it is naturally a slow-breeding animal. The Arctic hunting grounds have been depleted for many years and attention has been diverted to the Antarctic. There will now be a close season for pelagic whaling for nine months in the year; in some areas it is prohibited entirely; some species of whales, whales below a certain size, and females with calves are protected absolutely. Whaling from land stations is prohibited for six months in the year. If these restrictions do not improve matters, still more severe measures may have to be taken. It is to be hoped that Japan, a country that is rapidly extending its whaling interests, will adhere to this pact which has been signed by most of the British Empire, Norway, the United States, Germany and the Argentine. Canada and Portugal are expected to ratify shortly. This may be

where the chemist will take a hand. Whilst whale oil is a valuable source of raw material, it is not necessarily irreplaceable, and we suggest that the greatest contribution that could be made to the problem of whaling restriction is to investigate alternative sources of oil supply, possibly by synthesis, and so render whaling not only unnecessary, but uneconomic.

### Industrial Planning

NEWS of the development of a number of new factories associated with the chemical industry at Welwyn carries our thoughts back to the address on "The Chemical Engineer and Industrial Planning," which Sir Alexander Gibb gave to the Chemical Engineering Group at the end of April. No one would claim that Hertfordshire is a particularly fruitful source of the raw materials of chemical manufacture, nor is it adjacent to any large seaport or to the principal chemical using centres. But Welwyn is an outstanding example of wise town planning and has been laid out to cater for the enterprising industrialist who seeks to establish his works in healthy surroundings near to a main railway line and within easy reach of the Metropolis. There are many branches of the chemical industry for which such a location is eminently suitable and the chemical engineer, acting in co-operation with the town planning expert, has not been slow to recognise the advantages of the situation. It would be absurd to suggest that Welwyn should ever become a second Billingham, or Widnes; indeed the very process of selecting the garden city for specific manufactures serves in itself to emphasise the wisdom of scientific industrial planning.

### Scottish Alkali Works

IN Scotland as well as in England the chemical industry has shared in the improved industrial conditions during the past year. Notwithstanding the increased activities, Dr. B. Wylam, the chief inspector of alkali works in Scotland, is able to state in his annual report that, on the whole, the industry has been well conducted, with no outstanding causes of complaint. Here and there minor infringements have occurred, but legal action appears to have been avoided by the issue of letters of admonition to the offenders. During 1936 the manufacture of ammonia products increased by 4.5 per cent., but it is interesting to note that gasworks production rose by only 0.5 per cent., while manufacture in coke ovens increased by over 28 per cent. Dr. Wylam refers at some length in his report to an ammonium sulphate plant at Glasgow which was discovered to be emitting foul gases. Two sets of purifiers had been installed with the object of providing spare plant, containing fresh oxide, available for immediate operation at any time. Investigation showed that the oxide in both sets had become fouled and had ceased to absorb efficiently the hydrogen sulphide from the saturator gases. The fact that both sets were foul at the same time was deemed a grave dereliction of duty on the part of the management, but as there had been no previous cause for complaint and as immediate steps were taken to refill one set of purifiers, legal action was not resorted to, though the firm was admonished.

## Recent Developments in Textile Processing

By A. J. HALL, B.Sc., F.I.C., F.T.I.

THE textile industry is now creating a demand for all kinds of chemicals which formerly were either chemical rarities or manufactured only on a small scale and sold at very high prices. Chemical manufacturers, not only dyemakers, but also those whose operations were scarcely connected with textiles, are gradually awakening to this new demand, and there is reason to believe that before long textile auxiliary products will be as important as dyestuffs. It seems that the widening range of chemical products now being used in textile treatment is opening out a field of production into which non-dyemakers can now enter.

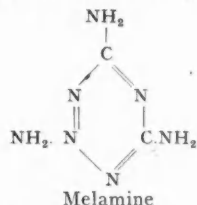
### Urea-Formaldehyde Creaseless Finishes

The anti-crease finish for cotton and rayon materials, introduced some five years ago by Tootal, Broadhurst, Lee and Co., Ltd., appears to have established itself permanently. As originally carried out, the process involves formation in the textile material of a synthetic resin from the components urea and formaldehyde. The urea resin is preferred to a phenol resin because of its better white colour, and also because it does not become discoloured when the finished fabric is exposed to acid, alkaline, or chlorination treatments; phenol resins develop various pronounced colours under such conditions. But the urea resin formation requires certain conditions—high temperature (150° to 180° C.) and acidity (a resin formed in the presence of an acid catalyst has a purer white colour and is more stable than one formed under the catalytic influence of an alkali)—which may adversely affect the durability of the cellulosic fabric. Recent developments have therefore taken place with the idea of avoiding these undesirable features of the process.

One more or less obvious method for mitigating the harmful effect of the acid is to employ a substance which is not acid of itself, but is capable of liberating acid during the reaction. Substances of this type and which have been found effective (B.P. 431,703) are glycerol diacetate, formamide, aniline acetate, and the ammonium salt of acetone-bisulphite. It is claimed as a further advantage that the resulting fabric is softer than when a free acid is employed to accelerate the condensation between the formaldehyde and urea. Salicylic acid has also been suggested. Thiourea is obviously an alternative to urea, but various other nitrogen compounds have proved suitable. By heating urea at 160° C. for 12 to 48 hours so that ammonia is evolved there results a technical mixture of guanidine, biuret, cyanuric acid, and guanyl urea which gives white resins with formaldehyde (B.P. 433,143).

### Non-Acid Catalysts in U-F Condensation

More recently (B.P. 458,877), the use of a particular type of urea substitute has made it possible to avoid the acid catalyst altogether and this seems to be an important step forward. The new process involves use of amino derivatives of 1:3:5-triazine such as melamine and formoguanamine. Condensation of these substances with formaldehyde takes place simply on heating to about 150° C. Melamine has the following constitution and results from heating cyanamide at 150° C.



The use of para-formaldehyde instead of formaldehyde is recommended in some processes, it being claimed that lower temperatures are then satisfactory (B.P. 766,829). Also by

heating the fabric under pressure in the vapour of formaldehyde (B.P. 452,891) a high temperature can be avoided.

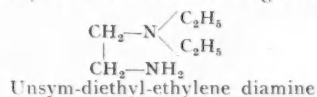
The uses of a synthetic resin of the formaldehyde-urea type has also been extended to the treatment of cellulose materials for the purpose of securing special dyeing properties in cotton and viscose rayon, and for making embossed effects permanent. This invites resin manufacturers to endeavour to produce and make available to dyers and finishers a water-soluble resin which can be directly applied to the textile material and there made insoluble by simple heating. The dyer and finisher would prefer to use the partly formed resin rather than a mixture of the components such as urea and formaldehyde. An attempt in this direction encountered by the writer was not satisfactory for the treated fabric became much yellower; it is generally essential that the resin shall be colourless. B.P. 435,871 describes the preparation of stable water-soluble urea-formaldehyde resins in which the stabilising agent is an inorganic salt, such as potassium nitrate, sodium chloride, and disodium hydrogen phosphate.

Synthetic resins have also proved useful for application to textile materials for the purpose of making them resistant to shrinkage in washing (B.P. 445,891), so that it can be anticipated that an increased use of formaldehyde and various nitrogen compounds will take place in this direction.

### Lubricants and Softeners

Softness of handle is a very important property in textiles and it frequently happens that the finisher must apply compounds having a lubricating or softening effect. Formerly, oils such as olive and castor oils, were mainly employed for this purpose, but in recent times attention has been given to the production of the most complex bodies which have unexpectedly shown themselves to have very high softening powers.

A large number of softening compounds have been prepared by condensing oleic and stearic acids with ethylene diamine and its alkyl derivatives, especially unsym-diethyl-ethylene diamine, which has the following composition:—



Instead of ethylene diamine it is possible to use ortho-phenylene diamine and 1:8-naphthylene diamine. Further, these derivatives can be treated with alkylating agents to yield quaternary ammonium bodies which have enhanced softening powers. The Sapamines (S.C.I.) are substances of this type and they have proved very useful for softening wool and other fibres for which they have substantive affinity. Information on the numerous products included in this range of substances can be found in B.P. 294,890, 219,304, 436,863, 470,890, and 433,230.

Another class of softening agent includes the thio-ethers made by reacting saturated or unsaturated monomeric aliphatic compounds (they should contain not less than C<sub>8</sub>) or hydro-aromatic compounds, which contain a mercapto group, with 1:2-propylene oxides which are substituted in the methyl group by a halogen, or hydroxy, or a mercapto radical. For example (B.P. 409,030), softening agents are obtained by reacting thioglycide with dodecyl alcohol, and dodecyl mercaptan with epichlorhydrin; these are oils.

Rubber latex has proved disappointing as regards its application to textile materials, although it might be expected to have good softening properties. Recent developments in the chlorination of rubber may result in the production of new compounds more suitable for textile treatment. The fatty alcohols and their sulphonation products constitute another range of substances which have valuable uses in treating textile materials. It seems that the alcohols themselves will

prove valuable, particularly as softening agents, while the sulphonated products will ultimately largely replace soap because of their detergent value and their excellent stability in hard water. The manufacture of such products involves hydrogenation of fatty acids and oils.

There are now a very large number of wetting out agents available, and it is difficult to forecast which is likely to be the most important type, for the simple reason that almost each month sees the discovery of new classes of compounds having wetting out properties. As showing how products are being used for these purposes which a few years ago would almost have been unbelievable, it may be mentioned that Peregol O, one of the most valuable wetting out agents for use in vat dyeing, is made by reacting ethylene oxide with octodecyl alcohol. Another type of wetting out agent is made from alkyl naphthalene sulphonic acids, especially isopropyl and dibutyl derivatives. Pyridine in admixture with various other substances, particularly sulphonated oils and fatty alcohols, is an excellent wetting out agent, and in addition products of this type have good dispersing power towards fatty impurities in the textile material being treated and also towards various dyes, especially vat dyes.

In printing with vat dyes it has been found that the presence

in the printing paste of various betaine (B.P. 420,095 and 446,269) and quaternary nitrogen and phosphorus, and ternary sulphur compounds assists the better fixation of the dye. Many of these auxiliaries are very complex (B.P. 439,675, 443,638, and 443,588) and include such substances as octodecylpyridinium bromide, triphenyl-benzyl-phosphonium chloride, and trimethyl-lauryl-ammonium hydroxide. Similar substances also form the basis of certain products (B.P. 422,466) now being sold for stripping the colour from vat dyed materials.

Recently, tetramethyl ammonium hydroxide has been introduced as a solvent (Tetrone) for cellulose. This substance is strongly alkaline like caustic soda, but has higher solvent power for cellulose. It seems likely that with such organic bases the application of cellulose finishes to textiles will be much facilitated. The advantages of proteins, such as lecithin for textile finishing, has also been recognised — its substantive affinity is most valuable since it may allow the production of *permanent* soft finishes in contrast to those which are destroyed in the first wash of the yarn or fabric. Lecithin is not very stable to acids and alkalis, but researches are in hand to modify the constitution of this substance so as to give it the required stability.

## Scientific Studies on Storage and Transport of Fruit

### The New Premises of the Covent Garden Laboratory

ON Monday afternoon, Sir Frank Smith, secretary of the Department of Scientific and Industrial Research, opened the new premises of the Covent Garden Laboratory, 9/13 Kean Street, London, W.C.2, which forms part of the D.S.I.R. organisation for research on the transport and storage of foodstuffs. General research on this branch of the department's activities is carried out under the guidance of the Food Investigation Board at the Low Temperature Research Station, Cambridge. The storage of fruit on a commercial scale is studied at the Ditton Laboratory, near Maidstone, and work on fish is carried out at the Torry Research Station, Aberdeen. The whole cost of the work exceeds £50,000 a year, to which the Dominion Governments make a substantial contribution. The work is carried out in the interests of the general body of consumers in this country.

#### Aims of the Laboratory

In the course of his speech Sir Frank Smith said the aim of the work carried out by the Department of Scientific and Industrial Research on the transport and storage of foodstuffs is, first, to reduce the wastage in food during its handling, and secondly, to improve its quality. In both cases the result is to make food a safer commodity for the industry to handle, and to give the consumer better value for his expenditure.

The greatest care, Sir Frank continued, is taken to secure in all the work the closest possible contact with industry. For this reason he had no hesitation in saying there was every justification for maintaining a laboratory at Covent Garden both as an important element of liaison with the trade and as a base from which any new type of wastage or any change in the incidence of types already known, may be observed. Imports of fresh fruit and vegetables amount to some 2 million tons annually, of which roughly a half come from British countries, and have a value of some £35 million sterling. They are thus the basis of a large trade in the United Kingdom; and they are carried almost entirely in British ships. One of the laboratory's main tasks is now to examine and report upon experimental consignments of fruit despatched from the Dominions and other parts of the British Commonwealth overseas with the collaboration of the shipping companies, and it has become clear that the laboratory can play a very useful role as a centre for work of this sort.

The Covent Garden Laboratory is something like the out-

patients' department of a hospital. Samples of fruit showing wastage or abnormal features are collected from the market or brought by salesman. Often the trouble can be diagnosed at once, but sometimes it is desirable to get the diagnosis confirmed by sending the patients to "specialists" at the Low Temperature Research Station, Cambridge, or the Ditton Laboratory.

One large room is available for the work of officers of the Dominions and Colonies where produce is inspected before being shipped in order that nothing may be exported which is not up to standard. Much of the knowledge gained from imported produce is of direct value to the home industry. Preliminary work on a survey of wastage in home grown fruit has, however, already been begun and plans are being made by the laboratory for a more systematic and extensive survey.

The accommodation at Kean Street includes two chemical laboratories, a large "ice box" for cooling fruit to -30° F. and three cold stores. One of the cold stores, maintained at 34° F., will be used for delaying ripening and for observations on apples; another at 45° F. for work on citrus fruits, and the third at 65° F. will be used as a conditioning room for initiating ripening. The two colder stores will also be used for studying the advantages of temporary cold storage for wholesalers or retailers, *i.e.*, storage of, say, mushrooms and melons for short periods. There is also a large amount of storage space where the temperature will approximate to market temperatures. By use of the three cold stores it will be possible to speed up or retard ripening processes so that the fruit can be made ready for experiment at any desired moment. In the chemical laboratories estimations of the sugar and acid content of apples, of course, varies between individual specimens and to get a representative sample the apples are frozen solid and then ground up into a fine powder.

An important measurement carried out in the chemical laboratory concerns the rate of respiration of fruit. This not only gives an indication of the age of the apple, but is important with research which is being carried out on the mechanism by which sugar breaks down to carbon dioxide. Another research problem on which the laboratory will concentrate is the function of acids in fruit. The alcohol content of apples increases as they grow older, and this is also a subject of measurement as it is hoped that this factor will prove an important diagnostic indication.

## Better Industrial Conditions in Scotland

### Points from the Alkali Inspector's Report

**D**R. B. WYLAM, chief alkali works inspector for Scotland, records a further all-round recovery in Scottish trade in his report for 1936, and says the chemical industry has certainly shared in the better industrial conditions.

The number of works in Scotland registered under the Act during 1936 was 91 in which were operated 163 scheduled processes as follows: 4 alkali (saltcake); 1 alkali (wet copper); 11 chemical manure; 4 nitric acid; 11 sulphuric acid; 8 sulphuric acid, Class II; 7 bisulphite; 7 lead deposit; 8 sulphide; 34 sulphate of ammonia; 2 muriate of ammonia; 15 gas liquor; 39 tar; 1 arsenic; 2 nitrate of iron; 1 picric acid; 3 chlorine; 2 muriatic acid; 1 paraffin oil; 2 zinc extraction. The number of registered works has decreased by four as compared with 1935; of these, two were for the distillation of tar, one for the manufacture of gas liquor, and one for the manufacture of sulphate of ammonia. One of the tar plants and the sulphate of ammonia plant have not been in operation for a period of years; the other two works have discontinued registration owing to concentration of manufacture in other plants. During the year, 332 visits of inspection were made to registered works and 200 chemical tests carried out; 256 visits were also made to places not registered under the Act.

#### Escape of Gases

The clauses of the Alkali Act which regulate the escape of noxious and offensive gases, have been generally well complied with and in no case have any of the statutory limits laid down by the Act been exceeded. There have, however, been three infringements of that section of the Act which provides that the best practicable means shall be taken to prevent the escape of noxious or offensive gases from the plant used in any registered process.

Referring to non-registered works, Dr. Wylam reports that several complaints have arisen through the use of trichlorethylene in small dry cleaning plants situated in shop windows in premises where the upper floors are occupied as dwelling houses or as offices. The cause for complaint has, in every case, been removed by the installation of adequate ventilation methods. A complaint was made against a rubber works in Dunbartonshire. Investigation showed that objectionable odours were occasionally emitted by the works and that the cold proofing plant was probably responsible. The management agreed to operate the plant with the greatest care and to take all possible precautions to prevent the emission of carbon disulphide and sulphur chloride vapours. At the end of the year no further complaint had been received.

Since the installation of a new coking plant at Glasgow, occasional complaint has been received of smoke and fumes. The fumes complained of were undoubtedly "green gas" evolved during oven charging. Great care has been taken in the design of the plant in order to reduce green gas emission as far as possible; a double collecting main has been installed with ascension pipes at each end of the oven, whilst a system of steam ejectors has been provided for the creation of an indraught during charging. The green gas emission is small compared with that evolved in most coking plants, but there are certainly occasions when a good deal of smoke is produced during charging.

#### Increased Production

Production generally has increased and this is particularly noticeable in the manufacture of sulphuric acid and of coke. Sulphate of ammonia production in Scotland in 1936 totalled 48,255 tons, against 46,262 tons in 1935 and 44,106 tons in 1934. Tar distilled in 1936 totalled 173,046 tons against 155,635 tons in 1935 and 158,379 tons in 1934.

The amount of salt decomposed in alkali works (including

wet copper works) has been slightly less than in 1935. The efficiency of the various plants has been maintained on a high level and the average amount of hydrochloric acid discharged to the atmosphere in residual gases from chimneys and other final outlets was 0.068 grains per cu. ft.; the average acidity was 0.30 grains calculated as sulphur trioxide.

A complaint was made by a tenants' association against an alkali works at Glasgow; it was alleged that the acid fumes caused a nuisance to the occupants of nearby houses. The matter was carefully investigated, but no justification for the complaint was discovered.

#### Sulphuric Acid Manufacture

The annual returns of the amount of pyrites, spent oxide and sulphur burned for the manufacture of sulphuric acid showed that the production in Scotland during 1936 has increased by some 12 per cent. as compared with 1935. More acid has been manufactured than in any year since 1920, but production is still some 15 per cent. below that of the years immediately following the war (1920-5). Escape of acid gases from both chamber and contact processes has been maintained at a satisfactory figure and, on no occasion has the statutory limit been exceeded.

The average escape from chamber plants was 0.07 grains per cu. ft. of exit gases, expressed as sulphur trioxide, whilst in concentration plants the average escape was 0.55 grains. In contact process manufacture the average escape for the year was 4.53 grains.

The testing of the exit gases emitted by chamber plant sulphuric acid works has been modified by the adoption of the method evolved by the Chief Inspector to the Ministry of Health. The procedure hitherto used for estimating total acidity is unsatisfactory in that it does not include that due to oxides of nitrogen. A modification was developed in the laboratory of the Ministry. This has been used in England as standard since 1935 and, in view of the more satisfactory figures which it gives, it has now adopted it as the official method in Scotland.

Reference has been made in previous reports to complaint against a large sulphuric acid works in a thickly populated district of Glasgow. The plant has always been maintained and operated in a manner entirely satisfactory within the meaning of the Alkali Act, but undoubtedly some discomfort has been caused on occasion to occupiers of adjacent properties by the acid constituents of the exit gases from both the chamber plants and the acid concentrators. Attempts have been made from time to time to reduce the acidity of the exit gases but without much success. The firm intends, however, to carry out a large programme of reconstruction and it is hoped that plant modifications will result in some mitigation of the nuisance.

#### Chemical Manure Works

The manufacture of superphosphates has shown an increase of some 10 per cent. as compared with 1935 and the production is on the same level as in 1934. The removal of acid gases by the various wash towers has been very satisfactory, the average absorption being 99.4 per cent., while the average acidity of the residual gases after scrubbing was 0.038 grains per cu. ft. expressed as sulphur trioxide.

The main objectionable constituent of the gases evolved during the manufacture of superphosphates from sulphuric acid and phosphate rock is silicon tetrafluoride, and it is not generally realised that the conversion of this gas to silica and hydrofluosilicic acid, by the action of water, requires some time for completion. This object may be attained by the erection of the scrubbing towers at a distance from the dissolving plant and by conveying the gas in a long flue, but in most Scottish works a delay chamber is interposed between

the mixer and scrubber. Here, the previously wetted gas follows a tortuous course through the chamber and this allows time for the reaction to take place; most of the silica is deposited in the delay chamber from which it can readily be removed.

Another important point is the location of the fan. Obviously the best position is at the outlet of the scrubbing tower; arranged in this way the whole of the gas collection and treatment system is maintained under suction and the fan has to deal only with clean gas. In some works the fan is placed between the dissolving plant and the towers; here it is subjected to the highly corrosive action of the hot dissolving gases and it also is liable to become choked with deposited silica.

### Sulphate of Ammonia and Gas Liquor

The manufacture of ammonia products has shown a further increase of about 4.5 per cent. as compared with 1935, but it is interesting to note that, while gasworks production has increased by only about 0.5 per cent., manufacture in coke ovens has increased by over 28 per cent. The production in shale works is practically the same as that for 1935. During 1936 all coke ovens have been fully employed, while the new modern coking plant recently erected at Glasgow has worked continuously since it was put into operation.

An ammonium sulphate plant at Glasgow was discovered to be emitting foul gas. Connected with the plant are two systems of closed box purifiers, and investigation showed that the oxide in both of these had become fouled and had ceased to absorb efficiently the hydrogen sulphide from the saturator gases. The installation of two sets of purifiers is intended to provide spare purification plant and the set not in operation should always contain fresh oxide and should be available for immediate operation at any time. The fact that both sets were foul at the one time was considered a grave dereliction of duty on the part of the management, but as there had been no previous cause for complaint in the operation of the plant in these works and as immediate steps were taken to refill one set of purifiers, legal action was not resorted to. A severe letter of admonition was, however, addressed to the firm concerned.

A distinct odour of hydrogen sulphide was observed at some distance from a chemical works in Aberdeenshire. Immediate investigation showed that the purifier attached to the ammonium sulphate plant was permitting the passage of unpurified gas owing to the oxide having become spent. There was a second purifier but this was in course of being refilled and was not available for immediate use. Instructions were given by the management for the plant to be shut down until the second purifier was refilled. It was explained that the man usually employed upon the purifiers was ill and that his place had been taken by another worker not experienced in handling the oxide and in keeping the purifiers in good condition.

### Tar Works

Examination of the production returns for the year shows that the amount of tar distilled has increased by 11 per cent. over the previous year; again the greatest increase is in coke oven production, which shows almost 40 per cent., while gasworks tar has increased by about 9 per cent. The decrease in iron works production is due to the use of a greater percentage of coke in blast furnaces; the use of coal in blast furnace practice has now been almost entirely abandoned in favour of coke. The production of tar in blast furnaces in Scotland between 1923 and 1930 varied from 30,000 to 60,000 tons per annum, but this has now fallen to about 2,000 tons; similarly sulphate of ammonia has fallen from 3,000-6,000 tons to something under 300 tons per annum.

The production of pitch has shown a steady increase over the last five or six years and is now up to the 1930 level of 47,000 tons. This is an increase of some 27 per cent. as compared with 1935. Increasing pitch production is probably due to the greater demand for tar distillation products. The pitch

market itself has not been good during the year and large stocks are lying in various parts of Scotland.

During routine inspection in July of a tar plant in Morayshire it was observed that the method of purifying foul gases was not sufficient to prevent their escape to the atmosphere; the attention of the manager was drawn to this and it was agreed that immediate steps should be taken to refill the purifier with fresh oxide. It was not possible again to visit the plant until October when it was found that no attempt had been made to comply with the requirements agreed upon in July. The manager stated that he had not been able to obtain the necessary oxide for repacking the purifier, but this explanation was considered to be totally inadequate. A letter was therefore addressed to the firm pointing out the requirements of the Act and requesting that the purifier should be refilled before the plant was again put into operation. This was done and, as the manager of the works had only recently been appointed, it was not suggested that legal action should be taken. A letter of admonition was addressed to the firm.

This type of infringement is undoubtedly most serious; there are occasions when plant breakdown occurs and infringement cannot be avoided, but it is essential that steps should be taken to rectify the error immediately it is observed or pointed out.

The amount of gases evolved during tar distillation is comparatively small, but their nature is nevertheless most objectionable and it is essential that adequate provision be made for their absorption in a properly designed purifier or for their incineration after passing through an adequate flame trap. Sufficient attention is not always paid by tar distillers to this important part of plant operation.

## Thermostatic Metals

### American Metals now Available in England

THE use of thermostatic devices is now being developed on a wide scale and the need for metals which respond to temperature changes is growing correspondingly. The uses to which these devices are applied are, indeed, so varied, including, as they do, automobiles, temperature controls and electric equipment generally, that a large number of different combinations of metals is essential.

In order to meet the varied requirements of users Henry Wiggin and Co., Ltd., has made arrangements with the H. A. Wilson Co., of Newark, N.J., to handle this latter company's full range of thermostatic metals in Great Britain and the rest of Europe. This range at present includes fourteen types of Wilco Thermometal and may be increased as new materials are developed. Wilco products have been perfected over a long period of years, and enjoy an excellent reputation for quality and performance. In the first instance, Wiggin's supplies will be drawn from New Jersey, but in due course the complete range will be rolled at Birmingham.

Thermometal, of whatever type, is an engineering material made under carefully controlled conditions, by joining together two metals of dissimilar expansion characteristics, so that movement with change of temperature and the forces which result, shall conform to the exact standards required for precision instruments. Such devices, though not expensive, add materially to the value of the equipment to which they are applied, by effecting economy in fuel costs, simplicity of operation, and the elimination of human control.

Having sent representatives to America for the purpose, Henry Wiggin and Co., Ltd., are now able to give advice as to the ways in which thermostatic control can be adapted with advantage in any particular circumstances, or as to the best type of thermometal to use for any given purpose. The products will be known in Europe as Wilco-Wiggin Thermometal. Readers at present using such devices or wishing to consider their adoption are invited to make full use of the help which Henry Wiggin and Co., Ltd., are prepared to give.

# Impending Retirement of Professor E. C. C. Baly

## Farewell Presentations

**P**ROFESSOR E. C. C. BALY, who for 27 years has held the chair of inorganic chemistry at Liverpool University, is to retire on September 30. In conjunction with Professor I. M. Heilbron, he has done considerable work in the production of sugar and more complex substances, synthetically, by the action of light on water charged with carbon dioxide, thus imitating natural reactions. In connection with this work Professor Baly visited twenty-five American universities in 1924. He was also associated with Dr. R. W. Riding in atom-smashing experiments which attracted widespread attention.

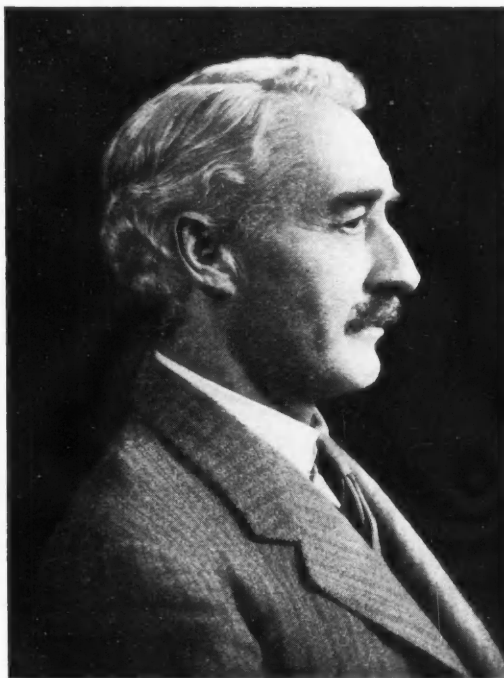
Son of Edward Ely Baly, of the Bank of England, London, Professor Baly was born in February, 1871, and educated at Temple Grove School, Aldenham, and University College, London. Subsequently he took his M.Sc. and became a Fellow of the Institute of Chemistry. In 1903 he was appointed assistant professor of chemistry and lecturer in spectroscopy at University College. Six years later he was elected a Fellow of the Royal Society and a year later became Grant professor of inorganic chemistry at Liverpool University. From 1915 to 1921 Professor Baly was deputy-inspector of high explosives at Liverpool. He became a C.B.E. in 1918, and is a vice-president of the Institute of Chemistry and of the Chemical Society. For a number of years he was president of the British Association of Chemists.

Representatives of the academic body and of the students paid their tributes to Professor Baly at a meeting of the Liverpool University Chemical Society on June 25, and in commemoration of the occasion he was presented with a drawing of himself by the Liverpool artist, Stanley Reed, a cheque, and a pocket barometer. Mrs. Baly also received a souvenir of the occasion, which was further marked by a special issue of the society's magazine, containing appreciations of the professor's work and of his long and invaluable association with the University.

Professor T. B. Abell, acting Vice-Chancellor of the University, presided, and Professor W. C. M. Lewis delivered the valedictory address, in which he quoted extracts from Professor Baly's inaugural address in 1910 in order to emphasise the ultimate purpose of each and all of his contributions. Even at that early date, he remarked, there was in Professor Baly's mind a clear foreshadowing of the concepts expressed in a more quantitative form, and at a later date, by G. N. Lewis, Brönsted, Bjerrum, and others—concepts which had formed, and still formed, the basis of a large part of current chemical research. In fact, the topics touched upon in his inaugural address constituted a remarkable forecast of the direction in which later advances had been made. Professor Baly had brought to his work an enthusiasm and tireless devotion and an exemplary capacity for hard work.

Turning to the more human aspect of Professor Baly's career, Professor Lewis referred to his inspiring and sympathetic attitude towards the students. Although his own department had always come first, he had identified himself

largely with the interests and activities of the University as a whole. Incidentally, he was one of the first British chemists to come into personal and friendly contact with the chemists of Germany and Austria a few years after the war.



Professor E. C. C. Baly.

Professor T. P. Hilditch, chairman of the Liverpool branch of the Society of Chemical Industry, recalled that he first met Professor Baly in 1904 when he (Professor Hilditch) entered University College as a first year student. Since then they had been closely associated, and the thing that struck him most of all was that in two respects Professor Baly seemed exactly the same as he was 33 years ago. He had lost nothing of his characteristic incisive manner of speaking nor of his vigorous friendliness. "We will always have in mind the man himself, and not only the distinguished scientist," he concluded.

Miss F. Hollis, lady vice-president of the Society last session, and Mr. F. J. O. Barlow, president last session, made the presentations.

Professor Baly, in reply, said he found it impossible to express his thanks adequately. "You must have a little pity for me," he continued, "for I find it excessively difficult to speak. You make me realise what retirement really means. To feel that this is

probably the last time I shall speak in this lecture room is rather a sad thought. I shall find it very difficult to resist catching the early tram so as to get here in the early morning each day. We have been a very happy family in the department, and it is to that fact that the advancement of the laboratory is due. They have been extraordinarily happy years. To the students I say: It is clear to me this evening the feeling of love and affection I have always had for you is heartily reciprocated." Mrs. Baly also expressed her thanks.

## Irish Free State Chemicals

### Import Statistics for April, 1937

IMPORTS of chemical manufactures and products to the Irish Free State during April show an increase in value compared with the corresponding month last year. For the four months January-April, the value of imports exceeded that for the same period in 1936 by nearly £2,000. Details of the imports are as follows:—Acids, £2,847 against £1,354 for April, 1936; calcium carbide, £652 (£273); food preservatives and flour improvers, £930 (£3,440); copper sulphate, £2 (£2,733); disinfectants, etc., £3,340 (£4,207); potassium compounds, £1,327 (£1,113); caustic soda, £856 (£2,081); other sodium compounds, £12,095 (£3,335); cream of tartar, £1,314 (£723); other chemical manufactures, £22,791 (£14,829) making a total of £46,154 against £38,094 for April, 1936.

GLYCERINE production in the Union of South Africa during the 1933-34 fiscal year amounted to 2,051,568 lb., valued at £25,070, compared with 1,855,808 lb. value £23,636, in the 1929-30 year.

## The Boys' Hostels Association Banquet

### Earl of Harewood's Novel Appeal for Support

A SQUAD of uniformed Post Office telegraph messenger boys appearing during the annual banquet on behalf of the Boys' Hostels Association at the Mansion House on June 24, made a novel diversion to a memorable evening. They handed to each guest a familiar buff envelope which contained an appeal from the Earl of Harewood for support, "so that the work of the Boys' Hostels Association may be continued on the foundations so truly laid under the auspices of His Majesty while Duke of York." Since the last banquet the Association has added to its responsibility for the John Benn Hostel in Stepney, the care and upkeep of King George's House, Stockwell. The Warden of the Hostels, Mr. Aubrey Townshend, M.B.E., announced that £4,071 had been subscribed. The Lord Mayor of London (Sir George Broadbridge) presided, and the Earl of Harewood was the guest of honour.

Viscount HORNE, who proposed the toast of "The Young Citizen," paid a warm tribute to Sir Ernest Benn to whom the great institution of the Hostels Association, he said, was mainly due. They all acclaimed the ardent spirit of enthusiasm which Sir Ernest had for the work and they had to credit to his efforts the wise counsels given at an impressionable age to many young citizens, the guidance of steps which might

bridge, starting from our side of the chasm, by our generosity, by our sympathy, and by our service."

The EARL OF HAREWOOD proposed the toast of the evening—that of the Boys' Hostels Association. The Association, he said, had had ten years' experience of the running of a hostel known as the John Benn Hostel, opened by the Prince of Wales in 1927, which benefited 80 boys at a time. The experience gained in running that hostel had given the association justification in opening another hostel in another part of London—King George's House at Stockwell—in order to accommodate a further 200 boys. Boys in the John Benn Hostel paid sums ranging from 2s. 6d. to 15s. weekly which covered the cost of their food, but did not contribute to the cost of administration. In consequence the authorities found themselves faced yearly with a deficit of about £2,000, but now that the extension at Stockwell had been made it was likely that the deficit would be not less than £6,000 a year.

#### The Mainspring of the Association

Sir Ernest Benn, who had been the mainspring of the Hostels' Association in the years gone by, had told him that there was no question of receiving more money than they could actually use. There was no question of turning the hostels into luxury hotels, but they were still a long way from possessing all that they required in the hostels and there was an immense field over which they would like to spread their beneficent work.

Sir ERNEST BENN, who responded to the toast, said he was doing so for the tenth and last time. A month previously Lord Leverhulme had been persuaded to accept the presidency of the Association and next year he would reply to the toast on its behalf. He would not be standing in that historic hall with the Lord Mayor occupying the chair if the cause they represented was not of the highest and best. "Your subscriptions," Sir Ernest declared, "come from the charity of your heart, but I want to say most emphatically that from the boys' point of view there is nothing suggestive of charity about this hostel. I am not given to dilate upon our rights as citizens," he proceeded, "I am more interested in our responsibilities, but there is one right I demand and acknowledge and that is the right of the adolescent boy to a decent home, to sympathetic guidance and the right type of surroundings. The working boys resident in the John Benn Hostel pay according to their needs and have for the past ten years paid all that they would pay in an ordinarily well-conducted working-class home if they footed the total bill for all the food they consumed."

#### A Coronation Honour

Sir Ernest referred in terms of appreciation to Mr. Aubrey Townshend, the Warden of the Hostels, and congratulated him upon the order conferred on him by the King in the Coronation honours. In conclusion he expressed the assurance that a record sum would be raised that night for the Hostels Association. The list of donations had already been headed by the magnificent contribution of £1,000. "I am not able to tell you from whom that wonderful start comes," Sir Ernest added, "my successor in office as president, Lord Leverhulme, has absolutely forbidden me to mention it."

The guests were toasted by Lord PORTAL, who as a representative of King George's Jubilee Trust stated that the contribution of the Trust towards King George's House at Stockwell was probably one of the best they had made.

Mr. NORMAN BIRKETT, K.C., replied.

Lord LEVERHULME proposed the toast of the Lord Mayor, who had to leave the banquet before the close of the speeches in order to attend a reception at St. James's. In his absence and on his behalf response to the toast was made by the Earl of Harewood.



Left to right.—Lord Leverhulme, Sir Ernest Benn, the Lord Mayor, the Earl of Harewood, Sheriffs Sir Frank Pollitzer and Sir Charles McRea, and Lady Benn.

otherwise have been apt to stray, and the provision of the atmosphere of home which kept boys from the sordidness of the streets. It was the youth of the country, Viscount Horne continued, on whom the future depended, and to whom the nation looked to carry on the proud traditions of the past.

Mr. JOHN T. CHRISTIE, Headmaster of Westminster School, who replied to the toast, spoke of the existence of two worlds—the one in which the young citizen enjoyed all the advantages of a public school education and the other in which the young citizen left school in his early teens to work for his living in a factory. "That is a thought from which you cannot escape," he said. "Within a mile of my school there are boys of the same age as my boys working in the roar of the machine room—thankful to have any work to do at all.

"I need not emphasise this point—there are admirable efforts, and surely a gathering like this represents the spirit behind those efforts, which are striving to bring these two worlds together. There is a tremendous gulf between the two worlds of the public schoolboy and the factory boy, such different lives allotted by fate to boys who have every bit as much right to the mental privileges of the young citizen. How are we going to remove that gulf? Surely by building a

# The Society of Chemical Industry

## Next Week's Meeting at Harrogate

**T**HE fifty-sixth annual meeting of the Society of Chemical Industry will be held at Harrogate from Monday to Friday next week, under the presidency of Lord Leverhulme, who has consented to accept office as president for a second year. It will be the fourth occasion on which the Yorkshire Section has entertained the Society, but the first official visit to Harrogate, the previous Yorkshire meetings having been held at Leeds (1895), Bradford (1903) and Leeds (1925). Dr. A. L. Roberts, of Leeds University, is the hon. secretary of the executive committee responsible for the Harrogate arrangements. The headquarters of the Society during the period of the meeting will be at the Hotel Majestic. The Harrogate Corporation has placed a number of amenities at the disposal of members attending the meeting.

From 2 p.m. on Monday the Society's office at the Hotel Majestic will be open for the registration of members participating in the meeting. The full programme for the week is as follows:—

### MONDAY.

8 p.m.—Reception by the president, Lord Leverhulme, and Lady Leverhulme, in the ballroom of the Hotel Majestic. Dancing. Refreshments.

### TUESDAY.

9.30 a.m.—Council meeting.

10 a.m.—Annual meeting in the ballroom, Hotel Majestic. Welcome by the Mayor of Harrogate, Alderman Harry Bolland, J.P. Business of the annual meeting. Address by the president, Lord Leverhulme.

10.30 a.m.—Ladies leave Hotel Majestic for a drive, including a visit to Knaresborough.

12.45 p.m.—Luncheon, by invitation of the chairman, committee and members of the Yorkshire Section, at the Hotel Majestic.

2.30 p.m.—Presentation of the Society's medal to Professor G. G. Henderson, F.R.S., followed by the medallist's address, "A Retrospect; Notes on some developments in the theory and practice of chemistry in the last half century." In the ballroom, Hotel Majestic.

3.30 p.m.—Group photograph.

3.30 p.m.—Golf competition for gentleman members, to be played on the Oakdale course by permission of the Club. Organiser, Mr. G. J. Denbigh.

8 p.m.—Reception and dance in the Royal Hall, Harrogate, by invitation of the Mayor (Alderman H. Bolland, J.P.) and Corporation of Harrogate. Evening dress, orders and decorations.

### WEDNESDAY.

9.30 a.m.—Chemical Engineering Group session at the Hotel Majestic. Open to all members and guests. A paper on "The Problem of Dust in Coal Mines," by Professor R. V. Wheeler, of Sheffield University.

12.15 p.m.—Leave Hotel Majestic by motor coach for Harrogate Station, whence members will be conveyed by special trains to York or Hull for the following visits:—

York.—Joseph Terry and Sons, Ltd., cocoa and chocolate manufacturers.

Hull—(a) British Oil and Cake Mills, Ltd., producers of vegetable oils of all descriptions and all types of cattle cakes. (b) Reckitt and Sons, Ltd., manufacturers of starch, blue, blacklead, polishes, bath cubes, etc.

Evening free—Dancing at Hotel Majestic.

### THURSDAY.

9.30 a.m.—Food Group session at the Hotel Majestic. A short symposium on Fruit Juices. Papers by (a) A. Charley, Long Ashton Research Station; (b) T. N. Morris, Low Temperature Research Station, Cambridge; (c) J. Arthur Reavell, chemical engineer. Open to all members and guests.



Lord Leverhulme, who will preside at the annual meeting of the Society of Chemical Industry at Harrogate, July 5 to 9.

12.30 p.m.—Luncheon of the Food Group at the Hotel Majestic. Open to all members and guests.

1.15 p.m.—Leave Hotel Majestic by motor coach for visit to Reuben Gaunt and Sons, Ltd., Farsley, combers and spinners of merino wool and manufacturers of woollen and worsted cloths.

1.45 p.m.—Leave Hotel Majestic by motor coach for one of the following visits:—(a) The Brotherton Library, University of Leeds. (b) Montague Burton, Ltd., of Leeds. (c) The Yorkshire Copper Works, Ltd., Leeds, the largest works in the world solely devoted to the production of non-ferrous tubes. (d) Haworth and the Brontë Parsonage. (e) The Board of Greenkeeping Research, Bingley.

7.30 for 8.0 p.m.—Annual dinner of the Society at the Hotel Majestic. Dancing from 10.30 p.m. to 1.30 a.m. Evening dress, orders and decorations.

### FRIDAY.

9.30 a.m.—Leave Hotel Majestic by motor coach for tour in Wharfedale and Nidderdale. The route will be via Bolton Abbey (where a stay of about one hour will be made) to Burnsall for lunch, and then via Grassington and Pateley Bridge to Fountains Abbey, where a visit of inspection will be made under the guidance of Dr. C. H. Moody, C.B.E., F.S.A., organist of Ripon Cathedral.

## Adhesives from Wood

### A New Invention of the German Dye Trust

AN affiliated concern of the German Dye Trust has developed an invention which promises to be of great importance for the paper-making industry. By this new patented process, a cellulose adhesive is now being produced in Germany from wood. This adhesive is not only a perfect substitute for flour-paste, but as shown by the initial tests carried out in practice, it also possesses a number of other applications. For example, the new adhesive dries without creasing or warping, and makes an excellent binding medium for the two surfaces. The adhesive effect is not obtained by superficial pasting, but by a felting process so that even after drying and after a long period in hot, dry rooms the paper does not separate. Moreover, there is no risk of the glue penetrating thin paper.

Being a pure cellulose product, the glue neither affects the colour of the material nor is there any danger of decomposition of the solution even if kept for a long time. As a result of these distinct advantages, the German paper industry is adopting this new adhesive to an increasing extent which in the view of the trade will have favourable effects upon the quality of the finished work.

## Central Agricultural and Scientific Bibliography

### Progress of the Scheme

THE general committee of the Central Agricultural and Scientific Bibliography has presented its annual report for 1936-37, in which it records that the scheme began with the opening of Section 1, Agriculture and Allied Industries, and on October 1, 1936, a second section, Section 5, Industrial Chemistry and Physics, was put into operation. This section was selected as dovetailing most closely with the industrial side of Section 1. The remaining sections, viz., 2, Mechanical Engineering; 3, Electrical Engineering; and 4, Civil Engineering, will come into operation as further financial support becomes available and the necessary arrangements are completed; other sections may be added in due course.

Through the courtesy of the Board of Education permission was given for the scheme to operate from the Science Library, whereby the advantage is secured of full and immediate access to all resources of the Science Library. In addition, useful contacts have been made in other directions, notably an agreement with the Bureau of Chemical Abstracts (Chemical Society and Society of Chemical Industry) which enables a useful experiment to be put into operation in the direction of "border-line" bibliographies. This depends on the co-operation of the Bureau's staff of abstractors who, while scrutinising journals in the course of their ordinary work, prepare a comprehensive list of those articles and papers that they come across, which should, in their opinion, be specially useful to subscribers to Section 1 of the C.A.S.B. In this manner a considerable number of references is made available, representing "border-line" knowledge not covered by the world's existing bibliographies devoted to agricultural subjects. This extension, which came into operation as from January 1, 1937, marks a new step in bibliographical technique and a distinct advance in the direction of wider co-operation between scientific institutions. The first three numbers of this bibliography have already been issued to all subscribers.

#### Nature of the Scheme

The underlying principle of the scheme is to provide additional facilities for utilising and increasing the enormous collection of references to sources of information available in the Science Library. In answer to inquiry, comprehensive lists of references to the literature of specific subjects are supplied. The completeness of these lists is further augmented by additional references obtained from the numerous specialist bodies, both at home and abroad, with which the library is in contact. English translations of the titles are given where these occurred originally in foreign languages, thus extending the usefulness of the bibliographies. In addition, selected bibliographies on subjects of general interest are circulated to subscribers each month, together with a monthly issue of Press extracts. Subscribers are kept in touch with important pronouncements of leading authorities by the circulation of copies of technical journals in which these statements occur. From time to time subscribers are supplied with copies of publications of recognised trade associations, as, for instance, those of the British Electrical Development Association and the Rubber Growers' Association.

The issue of Press extracts, a somewhat novel procedure, has already justified its inclusion, for the Press to-day reflects the position of agriculture in a particular way, since pioneers in agricultural development make use of this means of putting their views before the public as in no other industry, and the leading daily papers supply their readers with special articles and correspondence, which call for permanent recognition.

Further facilities available to subscribers include the loan of books and journals, in which original articles or subject matter occur, either as these are mentioned in the special bibliographies sent out, or as demands from subscribers may

come in. This service has already proved very useful, and is now further extended by arrangements with bodies other than the Science Library. In this way subjects outside the scope of the Science Library, such as economics and statistics, are being brought within the scheme.

Besides the selected bibliographies circulated each month, and those on specific subjects prepared in answer to inquiry, subscribers have the opportunity of suggesting titles for bibliographies on wider subjects of special interest, and during the first year of operation of the C.A.S.B. several such bibliographies have been commenced and will be issued shortly. This activity of the C.A.S.B. should be greatly extended in the future as requests are received and financial considerations allow. When the complete scheme is in operation, it will meet an important need for industry in all its branches, especially as it will enable subscribers who are concerned particularly with one section of the scheme to obtain information that is related to other sections. The committee feels that this is a fundamental function of the C.A.S.B. as providing information which could be obtained in no other way, or only after considerable and unnecessary delay.

## Industrial Progress at Welwyn

### Five New Factories Covering 19 Acres

INDUSTRIAL development at Welwyn at the present time is extremely active, and there are five factories covering nineteen acres in course of construction. Imperial Chemical Industries, Ltd., have sanctioned a scheme whereby their associated company, Mouldrite, Ltd., have taken a ten-acre site (with an option on a further five acres) where work is in progress on the erection of large new works for the production of moulding powders, a matter of first importance to the plastics industry.

The new pharmacological laboratories for Roche Products, Ltd., a branch of the Hoffmann-La Roche organisation, covering an area of five acres is rapidly taking shape. B.C.R. Factories, Ltd., are looking forward to the completion of their 20,000 sq. ft. factory situated on a site of one acre in Bridge Road East in the very near future, when they will commence manufacturing specialities from paper and textiles.

One and a half acres on Bessemer Road is the site of a three-storey factory with a floor area of over 20,000 sq. ft. in course of construction for Atomised Food Products, Ltd. The Garden City Candy Co., Ltd., a branch of a well-known foreign firm of chocolate manufacturers, are watching the rapid growth of their 25,000 sq. ft. double storey factory which will occupy a site of one and a half acres in Broadwater Road when completed. In addition to these individual building activities, inquiries for the remaining sectional factories in Tewin Road suggest that these will be all occupied very shortly. A number of manufacturers are already producing in this block of Welwyn's newest sectional factories.

AN estimate of 350,000 metric tons annually for 1935 and 1936 has been published in "Die Chemische Industrie" for the world production of bleaching powder. This approximates to the 1929 volume. Chief producing countries are Germany, Great Britain, Soviet Russia, United States, and Japan. World exports in 1936 of 60,000 to 70,000 metric tons compare with 70,000 to 80,000 tons in 1929. About 90 per cent. of the exports originate in Great Britain, Germany, and Japan, together with Belgium, France and Soviet Russia. Principal importers are Sweden, British India, China, Finland, Netherlands and Norway.

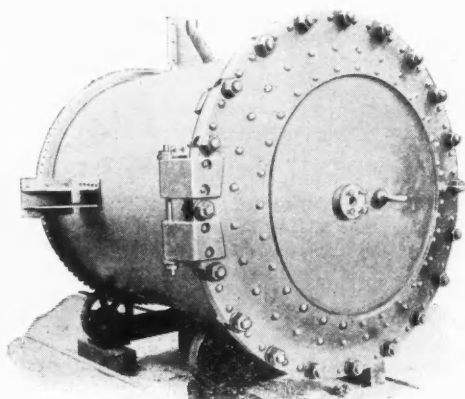
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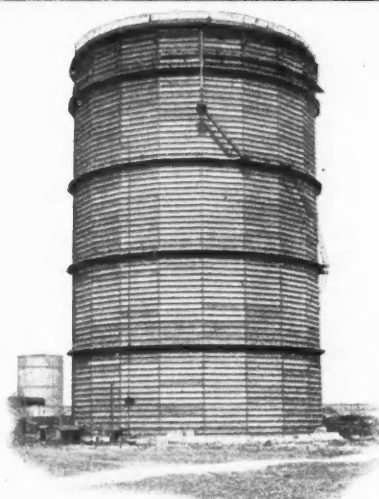
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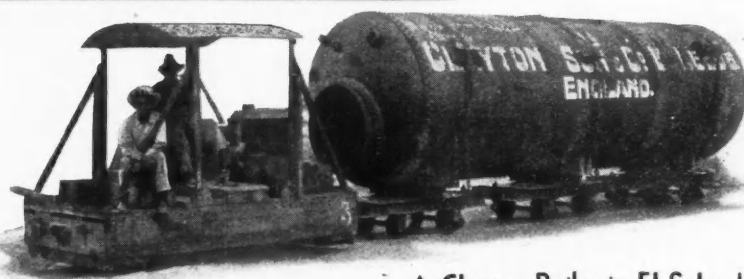
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of Liquid Propane  
and Butane  
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568 lbs. per sq. in.



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## Purification and Preparation of Mineral Products

### Work of the United States Bureau of Mines

**M**ANY non-metallic mineral deposits are unsuited to commercial use unless purified. To render them of utility commercially, impurities must be removed and the minerals treated to give them more desirable characteristics. This involves study of methods of purifying to determine the conditions of flotation, agglomeration, magnetic or air separation most suitable, as well as investigation of other special methods, states Information Circular 6,934, of the United States National Bureau of Mines, in its report of the work of the Non-Metals Division for 1936.

#### Lithium Minerals

An increasing demand for lithium compounds has been noted during the last few years, and the supply of the mineral used as the source of lithium—amblygonite (a lithium aluminophosphate)—is now becoming increasingly uncertain. When this mineral fails to meet the demand, spodumene, a lithium aluminosilicate of "feldspathoid" behaviour, which occurs in large amounts in South Dakota and North Carolina, may serve as the next most suitable source.

One of the most spectacular discoveries of the year is that spodumene, in passing to its high temperature or "beta" form, is so expanded and weakened that it can be rubbed down to a powder and separated from gangue minerals by air separating or screening methods. This is true even on lumps of ore as large as one's head. It will permit concentration of low-grade ores not previously regarded as economic and provide a supply of cheap concentrate for the growing and promising lithium chloride, lithium hydroxide, and lithium carbonate industry. Such a product is also expected to be of value in making high-lithium glass cheaply, thereby obtaining glass of increased toughness, especially for shapes that can be cast directly.

Another method for the recovery of lithium from spodumene has been developed. By adapting the chloride volatilisation process, it was found possible to extract lithium in the form of chloride from a spodumene concentrate. Limestone and calcium chloride are mixed with the spodumene and the mixture heated in a rotary kiln to at least 1,100° C., permitting 95 to 98 per cent. volatilisation of the lithium. A Cottrell precipitator will catch the lithium chloride fume from the partly cooled gases. The residue, if fired to clinkering temperature, is a white portland cement. This work on making low-grade spodumene ores available to the lithium industry is now complete and will be published shortly as a report of investigations under the title, "Chloride Volatilisation of Lithium from Spodumene," by Foster Fraas and O. C. Ralston.

#### Talc Free from Impurities

At present, most "pure" talc is imported from France, Spain, and Italy, and a satisfactory domestic source is in growing demand. Certain talcs in northern New York are mixtures of two components of non-uniform proportions. An investigation is now in progress in co-operation with the industry to separate the "tremolite" component from the "talc" and to standardise on uniform proportions of these two components. The investigation has already shown that the talc is readily separated by froth flotation. It differs, however, from the usual froth-flotation problem, in that the talc is readily floated. Whereas, the usual problem is to find a suitable reagent to float the one component, the difficulty here is to avoid flotation of the tremolite.

Kyanite, which withstands high temperatures and has other qualities that make it suitable for refractory manufacture, has been used in increasing quantities during the past few years. The kyanite deposits in the South-eastern States almost invariably contain large quantities of impurities, especially iron, and much difficulty has been encountered in devising processes satisfactory for the recovery of a commercial grade. Bureau

studies have shown that, with certain modifications, the most generally applicable process of concentration is froth flotation. Recent tests using reagents of the oleate type, especially a crude form of soap, have been quite successful. Agglomerate tabling has also been found of great value for certain simpler ores. For this work, only ore coarser than 100-mesh and smaller than about 20-mesh is adaptable. Any flotation collector that films the kyanite selectively may be used and followed by addition of about 1 per cent. of fuel oil to bring about agglomeration of the wet pulp. On passing over a concentrating table the large feathery floccules are carried off in the cross water. Exceedingly high grade concentrates of kyanite have been prepared in this simple manner.

A year ago the industry thought it wanted an important amount of its kyanite in coarse pieces to make grog for ceramic shapes. The coarse grog was to make up the backbone of the structure, its interstices to be filled with finer grog, and finally a binder of refractory clay to be used to fill the small voids. It has now become increasingly apparent that most kyanites are too weakened by heating through their inversion temperature into mullite, and the chalky material is not strong enough to make grog. An increasing use of finely divided kyanite is now developing. This favours the use of froth flotation for concentration.

#### Removal of Iron from Non-Metallics

The Non-metallics Station of the National Bureau of Mines has been working on the adaptation of raw kyanite to the demand for grog. Under 4 per cent. addition of magnesia to a pure, finely divided kyanite causes it to knit together densely and with little loss in melting point, so that the fired bats can be crushed up into coarse, dense grog. However, 4 per cent. magnesia leaves the material subject to heat shock and spalling. Lesser amounts demand higher temperatures of firing. Another promising lead is to use a certain amount of precalcined kyanite fines, which do not expand on heating, to mix with raw kyanite fines, which expand greatly in inversion, and a small amount of bond clay which shrinks considerably, the resulting mix having little change in dimension on firing. This material is then suitable for use as grog, or shapes can be made of this mix direct, without any further work than molding them before firing. Such a material could also be used to advantage in a ramming mix for lining furnaces. In industries where high resistance to slagging action is needed, as in glass melting, such materials should also be suitable.

The results of the kyanite investigations on removing attached iron from non-metallic minerals have been highly encouraging and should be applied to other minerals. In many cases, undesirable iron stains will impair the quality of otherwise useful minerals, including glass, sands, feldspar, kyanite, clay, barite and spodumene. In order to render them marketable and to decrease the necessity of getting purple minerals from different points, it is believed highly desirable that provision be made for extending these investigations. By so doing, the necessity of importing them from Europe should be reduced. White clay is needed for paper making and lithium minerals suitable for production of very tough glass must be low in iron.

#### Finely Divided Clays

The mineralogy of clay has been obscure, and few mineralogists know how to deal with ordinary, finely divided clays. The past 10 years has been intensive application of X-ray crystallography to clays, with the result that we now know that clays vary according to the clay minerals present, their size distribution, and their contamination by minerals that are not true clay minerals. The only means of separating clays into fractions has been by sedimentation methods, which tend to separate fines from coarse.

## Industrial Developments in the United States

### Chemicals and Chemical-Using Processes

**I**N his recently published report on economic and commercial conditions in the United States (H.M. Stationery Office, 3s.) Mr. H. O. Chalkley, Commercial Counsellor to the British Embassy at Washington, refers to a number of products and processes introduced in the United States. He mentions that a process has been invented for cleaning and degreasing wool by passing it through a refrigerated chamber. The layer of grease on the hairs is thus made friable and becomes detached from the wool, carrying away the dirt, which normally lies on the outside of the layer of grease.

Oiticica oil from Brazil is being used in large quantities to replace the more expensive tung oil, with which it can be mixed in a proportion of over two to one in the manufacture of varnishes.

A \$4,000,000 plant for the manufacture principally of Kraft paper bags from pine trees, for packing purposes has been installed at Savannah. By-products similar to animal fats, oleic acid, linoleic acid and cholesterol are being produced from fats derived from pine trees grown in the vicinity of Savannah.

Experiments are being made with the manufacture of buttons, buckles, hardware, table-tops and numerous other plastic articles from constituents of the soya bean.

In the manufacture of tin plate by the standard process of hot dipping in molten tin, a porous coating is obtained. The resulting plate is liable either to corrosion of the steel, or to accelerated corrosion of the tin due to the electrochemical couple it forms with the exposed steel. Two processes have been developed to correct this, one by the International Tin Research and Development Council which electro deposits a thin coating of tin from an alkaline solution stannate on degreased tinplate made in the ordinary way by dipping in molten tin, and the other which deposits the tin electrolytically from an acid solution direct on steel strip.

#### Stainless Steel Developments

Stainless steel is now being made in large tonnages by the open hearth process, using the barium process of refining. A new 8-2-4-1 molybdenum tool steel has now been developed and is successfully replacing the tungsten in the standard 18 tungsten 4 chromium 1 vanadium cutting steel. Radical departure has been made in permanent magnets by the use of a 65 per cent. iron, 25 per cent. nickel, 10 per cent. aluminium alloy to which may be added manganese, vanadium, cobalt, chromium, tungsten, molybdenum or copper, giving a coercive force of 500 oersteds in combination with a residual induction of 9,500 gauss.

A new process has been specially developed to effect a case penetration of 14 per cent. silicon in steel objects for chemical equipment, machine parts, bolts, nuts, etc., to render them non-corrosive against hot and cold hydrochloric and sulphuric acids, wet chlorine gases, salt-spray, etc. Its chief advantage is to give articles made from a cheap base metal the acid-resisting properties of expensive stainless steel or the effectiveness of high silicon irons. Flame cutting of metals has been transformed from a crude process to one which has a precision almost comparable with that of machining.

Cast iron is now being given properties comparable to those of malleable and steel castings without proportional increase in cost and is being used for camshafts, crankshafts, etc., for motor vehicles. A special heat treatment in ammonia provides cast iron alloyed with small quantities of aluminium and chromium with great surface hardness and resistance to wear, replacing manganese and expensive tool steel parts.

The porcelain-enamelling industry has shown rapid growth due to the development in the application to metals of glass-like acid-resisting enamels by fusing. Beryllium copper, a new member of the hard bronze group of alloys responding to

heat treatment and possessing greater strength than any of its predecessors is finding its place in the general engineering industries.

A new source of aluminium from the mineral alunite instead of from the usual bauxite, is being developed. In the light alloy field, the structural application of aluminium to large engineering constructions such as railway coaches, cranes, bridges, ships, etc., is making substantial progress. An experimental direct rolling-mill for aluminium, in which liquid metal is poured between a single set of rollers and emerges as a continuous strip is in production, after a year of experiments. The annual output is about 1,500,000 pounds. Alclad products using a pure metal aluminium coating on a core of aluminium copper alloy have proved to have great merit and commercial application.

Selenium, a by-product from the lead refineries, is being used extensively in the tyre industry to improve the wear resistance. Power metallurgy, allowing the bringing together of elements of widely different densities and melting points, such as copper and graphite, molybdenum and silver, carbon and tungsten, etc., is growing into an important industry. The electrical industry is making many parts such as dynamo and generator bushes, contact points, magnet cores and welding rods, whilst the tool steel industry is being almost revolutionised by the enormous superiority of the new hard powder pressed material.

### Small Laboratory Stirrers

#### An Inexpensive and Sturdy Model

THE popularity of small laboratory stirrers shows how useful they have been found in all types of laboratories. The Victor induction stirrer, which is illustrated, is the simplest and most inexpensive laboratory stirrer yet placed on the market. It is operated by an air-cooled induction motor, available for use on either 105-115 or 200-250 volts, 50 cycle alternating current.



The Victor Induction Stirrer.  
(J. W. Towers & Co., Ltd.)

The motor is practically noiseless and, having no brushes, there is no sparking, eliminating fire hazards. Its power is sufficient for the usual laboratory stirring operations, and for mixing paints, etc. The consumption is approximately 40 watts. The speed of the motor is approximately 2,000 r.p.m. and its power is not reduced by rheostat control. To regulate the degree of agitation the pitch of the propeller is changed, with the aid of a pair of pliers. The propeller and rod are made of Monel metal. The stirrer can be used in the ordinary type of laboratory stand, as the total weight is less than 2 lb.

## Liquefied Petroleum Gases in the United States

### Sales Continue to Expand in 1936

THE market demand for liquefied petroleum gases, exclusive of exports, increased 38.8 per cent. in 1936 compared with 1935, according to reports submitted to the United States Bureau of Mines. Sales of liquefied petroleum for domestic use, gas manufacturing, industrial fuel and chemical manufacturing, and fuel for internal-combustion engines totalled 106,652,000 gallons in 1936 compared with 76,855,000 gallons in 1935. Exports of liquefied petroleum gases increased from 4,237,000 gallons in 1935, to 4,897,000 gallons in 1936, a gain of 15.6 per cent.

A review of the market requirements for the various liquefied gases shows that sales of propane increased from 26,814,000 gallons in 1935 to 36,502,000 gallons in 1936, a gain of 36.1 per cent. Deliveries of butane, which are larger in volume than any of the liquefied petroleum gases, increased to 47,455,000 gallons in 1936, or 39.2 per cent. over the 1935 total of 34,084,000 gallons. Sales of propane, butane mixtures, ranking third in relative volume, gained 49.1 per cent. in 1936. The demand for pentane in 1936 was limited to 2,575,000 gallons, a quantity only slightly above the 1935 deliveries.

#### "Bottled Gas" Uses

The industrial use of liquefied petroleum gases totalled 47,894,000 gallons in 1935, and constituted 62.3 per cent. of the market demand, while the comparative total for 1936 is 67,207,000 gallons or 63.1 per cent. of all deliveries. A tabulation of sales records as reported to the Bureau of Mines, shows that the 1936 total is divided as follows: industrial fuel 40,140,000 gallons, chemical manufacturing 14,445,000 gallons, internal-combustion-engine fuel 12,476,000 gallons, and miscellaneous uses 206,000 gallons. The item covering the use of liquefied petroleum gases for motor fuel is of special interest, as it is the first time that this demand has been segregated in this annual survey. Sales of liquefied petroleum gases for domestic or "bottled gas" purposes accounted for 28.1 per cent. of the total demand in 1936. The quantity reported under this classification is 30,014,000 gallons, a gain of 40.4 per cent. over 1935 deliveries. Liquefied petroleum gases purchased by gas companies showed an increase of 23.6 per cent. in 1936, totalling 9,371,000 gallons compared with 7,581,000 gallons in 1935.

Propane, because of its high volatility is sold principally for domestic purposes, or for cooking and lighting in homes where gas from gas-company mains is not available. This demand of 24,423,000 gallons accounted for two-thirds of the total sales of propane in 1936. Propane is of secondary importance as an industrial fuel and a small amount is used as a raw material in chemical manufacturing. Sales of propane for industrial fuel and chemical use were reported as 11,030,000 gallons in 1936. Less than one million gallons of propane were purchased by gas manufacturing companies in 1936.

#### Butane—Propane Mixtures

Butane, less volatile than propane, has a higher B.T.U. value per gallon, hence it is used chiefly as an industrial fuel, there being 28,553,000 gallons of butane (60.2 per cent. of total deliveries) sold under this caption in 1936, including a small quantity going to chemical plants for raw material. Distributors reported that 9,622,000 gallons of butane were used as fuel in internal-combustion engines in 1936, a demand confined largely to the Pacific Coast area. Deliveries of butane to gas companies, which declined from 5,064,000 gallons in 1934 to 5,042,000 gallons in 1935, registered a gain in 1936, when a total of 6,227,000 gallons was reported under this classification. Domestic uses of butane increased over 100 per cent. in 1936, showing 2,956,000 gallons compared with 1,353,000 gallons in 1935. Propane-butane mixtures are

sold largely to chemical plants for raw material and a minor quantity is consumed as industrial fuel. The domestic and gas manufacturing demand, respectively, for propane-butane mixtures was approximately two million gallons in 1936, while about 2,700,000 gallons were sold for motor fuel in the same period.

Bulk shipments totalled 82,575,000 gallons in 1936 or 77.4 per cent. of the total movement of liquefied petroleum gases into consumption, compared with 61,457,000 gallons or 80.0 per cent. of the 1935 marketed demand. Cylinder and drum deliveries were relatively greater in 1936, 22.6 per cent. of the liquefied-petroleum-gas sales being handled in these containers compared with 20.0 per cent. in 1935. The volume of cylinder shipments increased from 15,398,000 gallons in 1935 to 24,077,000 gallons in 1936.

## Letter to the Editor

### Holidays with Pay in the Heavy Chemical Industry

SIR,—In the account of the evidence given by Sir Walter Citrine to the Government Holidays with Pay Committee printed in your issue of June 19, the following statement appears:—"The Trade Union Congress has cognisance and collective agreement for holidays with pay in both the light and heavy chemical industry."

Examples of firms who have conceded holidays with pay are then given, but only two chemical firms are quoted. In order to avoid any possible misapprehension, would you kindly allow me to inform your readers that the heavy chemical industry was one of the first to concede holidays with pay nationally. Ever since 1918 members of the late Chemical and Allied Employers' Federation (now the Association of Chemical Employers) have given to their works employees holidays with pay based upon regulations agreed upon by the Chemical Trade Joint Industrial Council.—Yours faithfully,

R. HEWITT,  
Secretary.

Association of Chemical Employers,  
Clayton, Manchester.

## Chemical Engineering Congress

### Publication of the Transactions

THE publication this week of "Transactions of the Chemical Engineering Congress of the World Power Conference," marks an important stage in the history of chemical engineering. Not only was the congress, with its world-wide scope, the first international conference devoted to chemical engineering, but it testified that chemical engineering had come, so to speak, of age and that chemical engineers are building up their profession on the broadest scientific, economic and cultural foundations. The life of the congress is thus reflected and made permanent in the five volumes of Transactions, which comprise the many papers presented by leading authorities from the chief countries throughout the world and the records of the discussions as well as accounts of the opening and closing sessions and of the social functions. The Transactions open with a thoughtful foreword contributed by Lord Leverhulme, and the subjects treated are divided into twelve sections.

The publication price of the five volumes is £12. Separate copies of the individual volumes can, in certain cases, be purchased at £3 each. A detailed prospectus, containing a list of the contents of the Transactions, can be obtained from the publishers, Percy Lund, Humphries and Co., Ltd., or from the National Committees of the World Power Conference.

## Personal Notes

SIR GEORGE BEHARREL, managing director of the Dunlop Rubber Co., Ltd., has been elected chairman of the company in succession to the late Sir Eric Geddes.

MR. HUGH E. HAIG, Clayton, Dairsie, who was for some time secretary and a director of the Guardbridge Paper Co., Fife, died on June 25.

MR. J. BELL has received the degree of D.Sc. at Glasgow University, his thesis being "Heavy Water and the Structure of Crystalline Hydrates." Mr. J. D. Loudon also received the degree of D.Sc. with a thesis on "The Cationoid Reactivity of Nitrodiphenylsulphones."

SIR FREDERICK GOWLAND HOPKINS is to give the address at Birmingham University, when the new A. E. Hills Chemistry Building is formally opened by the donor on July 7.

MR. JOHN FULTON, Bellshill, sole partner of the Crown Chemical Works, Bellshill, and his wife, celebrated their golden wedding recently. They are both natives of Ayrshire, and went to Bellshill some 46 years ago.

PROFESSOR G. G. HENDERSON has presented to Glasgow University a valuable collection of books and reprints on chemistry, together with a series of engravings and photographs relating to the history of chemistry.

## Chemical Notes from Foreign Sources

### Manchukuo

THE COAL HYDROGENATION PLANT of the Manchuria Oil Industry Co. is now approaching completion at Ssupingkaï. The originally planned capacity is to be doubled.

### Greece

A COMPANY FOR THE MANUFACTURE OF GAS MASKS has been founded under the aegis of the Bodosakis-Athanasiadis concern.

### Italy

ANNUAL PRODUCTION OF POTASSIUM SALTS from molasses residues at the plant put into operation by L'Appula Soc. Anon., 1935, is now reported to be 4,000 tons. The range of salts produced includes the chloride, sulphate, bicarbonate, hydroxide and metabisulphite.

LABORATORY TESTS BY THE MONTECATINI CONCERN on the production of potassium compounds from leucite have given such encouraging results that it is hoped to be able to produce caustic potash, potassium carbonate and potassium nitrate to the annual value of 20 million lire.

### Germany

PRODUCTION OF SULPHUR in the gas purifying plants of the Ruhrgas A.G. during 1937 amounted to 7,400 tons, as compared with 6,800 tons last year.

BUNA SYNTHETIC RUBBER MANUFACTURE is reported to be giving a product of uniformly good quality. The plant is being enlarged to meet over one-third of the German rubber requirements and the first large factory will commence production at the beginning of 1938.

SUCCESSFUL experiments on the production of a new synthetic textile on the basis of a vinyl polymerisation product have been carried out by the I.G. Farbenindustrie. Its low meeting point renders it unsuitable for clothing, but it has possibilities in filtration work owing to its exceptional resistance to acids and alkalis.

THE WESTALISCH-ANHALTISCHE SPRENGSTOFF A.G. announces in its report for the trading year 1936 a considerably increased net profit of 1.38 million marks (0.81 million previously) and a dividend (upon the doubled share capital) of 8 per cent. (unchanged). The explosion reserve, which had fallen to 0.68 million marks following the explosion in 1935, has been raised to 5 million marks.

### Japan

A NEW CELLULOSE-PRODUCING COMPANY is in course of formation with a capital of 20 million yen as an offspring of the Ogai Paper Co. A factory is to be erected in the prefecture of Yamaguchi, with an annual production of 20 to 30 thousand tons cellulose destined for the staple wool industry. At a later date it is intended to produce cellulose for the paper industry.

### Poland

ACETIC ANHYDRIDE IS NOW BEING PRODUCED at the Skarzysko Chemical Works.

### France

THE COMPAGNIE DE PRODUITS CHIMIQUES (Péchiney) announces in its report for 1936 a trading profit of 58,000 million francs and a net profit of 28,000 million francs. An exceptional demand was experienced for copper sulphate, particularly towards the end of 1936. The sulphuric acid works at Salindres were recognised on the most up-to-date lines. The activities of the research department bore fruit in several fields of manufacture. Aluminium production has continued to expand and the factories at Saint Jean and Argentière were enlarged accordingly. After completion of further extensions planned for the current year, the company will be in a position to meet the entire home demand for aluminium. Licences for the production of the company's extra pure aluminium (99.99 per cent.) have been granted to many foreign firms.

## Research in Canada

### Annual Report of National Research Council

THE National Research Council of Canada, at Ottawa, has just issued its 19th annual report, copies of which are available for consultation in the Reference Library, Canada House, Trafalgar Square, London, S.W.1.

According to this report, the Council has thirty-three committees through which it brings to bear on Canadian problems the knowledge of scientific men and industrialists on such diverse subjects as field crop diseases, grain research, storage and transport of food, weeds, and wool. These are all joint committees with the Dominion Department of Agriculture, so that the work in the fields covered is properly co-ordinated and duplication of effort is avoided. Other subjects handled under committees are laundering, leather, magnesian products, and forestry.

Outside activities of the Council include the award of scholarships for post-graduate research at Canadian universities. During 1936-7, thirty students were given awards, and a recent announcement states that for 1937-8, forty-seven scholarships have been granted. Limited funds are provided as grants in aid of research to qualified workers, mostly in departments of Canadian universities. The Council also maintains a close liaison with research organisations in other parts of the world, particularly within the Empire.

An important function of the National Research Council is the development and maintenance of a national scientific library, which is under the direction of the Division of Research Information. This division also serves as a centre of research intelligence, compiling bibliographies and making such other library researches as are required for the guidance of laboratory research workers.

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## Irish Free State Paint Trade

### Rapid Development Since 1931

THE Irish Free State paint industry has shown rapid development during the past four years, the number of manufacturers increasing from three to fourteen since 1931. In order to promote the industry, a duty of 20 per cent. *ad valorem* was imposed in 1932 on all paint imports. This was later increased to 50 per cent. *ad valorem* on all importations. As a result of these measures imports have declined by approximately 80 per cent. since 1931; and imports of varnish, which are subject to the duty of 7s. 6d. per gal. (5s. preferential rate), have now practically ceased. Most of the raw materials used in the making of paints are permitted entry duty free. Dry colours, for instance, are free, as well as white and red lead in dry or paste form, and artists' colours in tubes. Turpentine, gums, and rosin are also duty free. Stand oils are imported free under licence, but linseed oils, owing to the recent establishment of crushing mills in this country, are dutiable at 33½ per cent. Up to the present only certain grades of linseed oil have been manufactured locally, chiefly crude and boiled oils. Refined linseed oil, protected by a duty of 33½ per cent., is now on the point of being manufactured in the Saorstát, and imports will no doubt continue to decline.

#### Increased Imports from the United States

Imports of barytes, ground, including blanc fixe, have increased from 3,270 cwt. valued at £715 in 1931 to 13,082 cwt.—chiefly from Germany and the United Kingdom—valued at £3,083 last year. White lead imports, including stiff paste, have increased from 12,252 cwt. (£24,256) to 22,025 cwt. (£47,550), and imports of ochre and earth colours—chiefly from Great Britain—from 6,222 cwt. (£6,720) to 13,197 cwt. (£12,375). Other kinds of raw materials (including leaded zinc, white and basic lead sulphate) have increased from 24,359 cwt. (£31,462) in 1931 to 73,272 cwt. (£79,300) last year. The chief sources of supply were, in order of importance, the United Kingdom, the United States, Germany, Belgium, Netherlands, and Spain.

Imports of prepared paints, distempers, and enamels (ready mixed) have declined from 57,050 cwt. (£183,100) to 11,920 cwt. (36-030) last year. The bulk of the paint requirements were formerly imported from the United Kingdom, with occasional shipments from Germany, the Netherlands, Belgium, and France. The United Kingdom is still the outstanding source of supply, although increasing imports from the United States have appeared during the past two years. In 1931 paint imports from the United Kingdom totalled £180,000, or 98 per cent. of the total imports, whereas in 1935—the latest year for which details of imports are available—they had declined to £51,500, or 87 per cent. of the total imports for that year.

#### Branch Plants of British Manufacturers

Many leading British paint manufacturers have established branch plants in the Irish Free State. In the opinion of one firm, the demand at present is not sufficient for the large number of firms catering to the trade, and in time some of them may be forced to withdraw. On the other hand, the consumption of paints is increasing, and with the improvement in the type and quality of building which is going on throughout the country, the quantity of paint required is much greater than formerly.

The prices for most raw materials used in the manufacture of paint have increased perceptibly during the past year. The linseed oil price is based on the United Kingdom market price, which has doubled in the past eighteen months, and is now approximately £34 per ton c.i.f. The increased price is due in part to the enhanced American demand for linseed. Importers are now looking for imports from India as an alternative source of supply. Prices of white lead are fixed by the

White Lead Convention. Although there are one or two individual firms which offer quotations, the combine dominates the trade for this commodity.

There has been a large United States production of turpentine, and excess stocks have been acquired during the past few years, so that the price of this commodity has remained relatively cheap—approximately 33s. 6d. per cwt. in barrels, landed—about the same price as that of a year ago. Most of the turpentine used in this country comes indirectly from the United States through the United Kingdom. Rosin prices are now relatively high, ranging from 18s. to 22s. per cwt. f.o.b. United Kingdom ports, according to grade. This is an increase of almost 50 per cent. in six months. The freight rate from Liverpool to Dublin would add another £2 per ton to this cost.

At one time certain dry colours, such as ferrite yellow, an oxide of iron chemically produced, used to come from Canada, but it is now being manufactured in England under licence from the Canadian patentee.

## The Physical Society

### Award of the Duddell Medal

THE Council of the Physical Society has awarded the 14th Duddell Medal to Professor Walter G. Cady, professor of physics at the Wesleyan University, Middletown, Connecticut, U.S.A., for his work on piezo-electric resonators and oscillators as standards of frequency. The medal is awarded to "persons who have contributed to the advancement of knowledge by the invention or design of scientific instruments, or by the discovery of materials used in their construction."

Professor Cady's pioneer work on the subject was published in 1922 ("Proceedings of the Institution of Radio Engineers," 10, 83) and the value of the device may be judged from the fact that it stimulated research work on the subject in all parts of the world, over a thousand papers having been published on the properties of piezo-electric crystals since the appearance of Cady's first paper. Of course, these are not all due to Cady's work, for Langevin had previously used piezo-electric crystals as vibrators for under-water signalling, but Cady's particular contribution—the use of the quartz resonator as a standard of time or frequency—has quite obviously inspired most of the work. The use of these resonators as standard vibrators has made it possible to measure frequency and intervals of time with an accuracy not previously attained. It is scarcely necessary to emphasise the importance to physics of increased accuracy in such fundamental measurements. Among the applications which have already been made the following may be mentioned:—(1) The quartz clock which is now used as standard in some observatories, and is in some respects superior to the pendulum clocks, and in any case is a most valuable supplement to them; (2) the measurement and control of the frequency of alternating currents in connection with measurements of dielectric constant and "absolute" electrical measurements; (3) the measurement of the velocity of ultra-sonic sound waves.

Professor Duddell, who was responsible for so much elegant instrumental work, would have been the first to recognise the beauty of Professor Cady's device, and it will be a source of great satisfaction to all scientific workers to know that the value of Professor Cady's work has been recognised in such an appropriate manner.

EXPORTS of sodium nitrate from Chile during the first 4 months are reported at 780,819 metric tons, whereof 447,853 were destined to the United States.

## William Warne and Co., Ltd.

### 100 Years as Rubber Manufacturers

WILLIAM WARNE AND CO., LTD., the well-known rubber manufacturers of Barking, Essex, are this year celebrating their centenary. The business was established in the year 1837 as The London Caoutchouc Co., with offices at King Street, Cheapside, and a factory at Tottenham. In 1850 the title was changed to William Warne and Co. The firm passed through many vicissitudes during those early years but, after the process of vulcanisation had been invented in 1843, the scope of their rubber manufactures widened considerably and much progress made leading up to the period 1880-1912, which might be termed the "golden age" of the rubber industry generally. In 1895 the firm became a private limited company, about which time the old factory at Tottenham was given up, and the present works, occupying some 15 acres at Barking, was purchased.

"Warne's" bear an honoured name in the rubber world and their products, which cover a very large range including hank linings, special acid-resisting hose and tubings and tank linings, sheets, washers, rings, gloves, aprons, corks and bungs, have a fine reputation for quality. The centenary celebrations, in which all the employees of the company participated, took the form of a sea trip to Ostend by the "Queen of the Channel," on June 10. The occasion was also marked by a presentation to Mr. E. J. Coles, managing director, from the firm's Sports Club, which happily coupled the event and the appreciation felt for Mr. Coles by the firm's employees.

## Extreme Working Conditions

### Possibilities of their Extension

EXTREME working conditions and the possibilities of their extension will be the chief topic at the general meeting of the Dechema Deutsche Gesellschaft für chemisches Apparateswesen (German Society for Chemical Engineering) this year, to be held on the occasion and in the province of the National Congress of German Chemists, on July 6 at Frankfurt-on-Main. The papers will be read in the large auditorium of the Physikalischer Verein in the University, Robert Mayer Street. The lectures include:—

Prof. Dr. C. Ramsauer, Berlin: "Technical limitations for high pressure and vacuum."

Prof. Dr. H. H. Franck, Berlin: "Technical limitations at highest temperatures."

Prof. Dr. P. Debye, Berlin: "Technical limitations at lowest temperatures."

Prof. Dr. P. A. Thiessen, Berlin: "Smallest dispersions and their technical applications, theoretically."

Dr. R. Auerbach, Berlin: "Smallest dispersions and their technical applications, practical experiences."

Privat-Dozent Dr. P. Wulff, Munich: "Possibilities for increasing the accuracy of measurements and control."

There will be a public session of the "Arbeitsausschuss für Systematik der chemischen Technik bei der Dechema" (Dechema-Committee for systemising chemical technics), at which "General Symbols and flowsheets for the chemical technology" will be discussed.

## Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

### Specifications Open to Public Inspection

MANUFACTURE OF ARSENOBENZENEMONOSULPHONYLATES.—I. G. Farbenindustrie. Dec. 19, 1935. 30370/36.

TREATMENT OF ARTIFICIAL-SILK FABRICS.—I. G. Farbenindustrie. Dec. 19, 1935. 32921/36.

MANUFACTURE OF SODIUM OXALATE and sodium hydroxide.—H. Lawarree. Dec. 18, 1935. 33873/36.

PRODUCTION OF HYDROGENPEROXIDE.—Naamlooze Vennootschap Industriele Maatschappij Voorheen Noury and Van Der Lande. Dec. 21, 1935. 33991/36.

MANUFACTURE OF STABLE COLLOIDAL DISPERSIONS OF METALS.—I. G. Farbenindustrie. Dec. 18, 1935. 34277/36.

MANUFACTURE OF PLASTIC MASSES.—I. G. Farbenindustrie. Dec. 20, 1935. 34278/36.

PROCESS OF AND APPARATUS FOR THE MANUFACTURE OF FILMS, foils, bands, and the like from cellulose solutions.—E. Czapek. Dec. 17, 1935. 34749/36.

MANUFACTURE OF SYNTHETIC RESINS and compositions containing the same.—E. I. du Pont de Nemours and Co. Dec. 17, 1935. 34753/36.

MANUFACTURE OF TRI-(4-BUTADIENYL-1,2) AMINE.—I. G. Farbenindustrie. Dec. 20, 1935. 34841/36.

MANUFACTURE OF SULPHURIC ACID by the contact process.—A. Zielen. Dec. 18, 1935. 34859/36.

PROCESS FOR THE PRODUCTION OF LUBRICATING OILS.—Ruhchemie, A.-G. Dec. 20, 1935. 34968/36.

PROCESS FOR PRODUCING LUBRICATING OILS.—Ruhchemie, A.-G. Dec. 20, 1935. 35074/36.

MANUFACTURE OF HIGHLY-CONCENTRATED VERMIN-DESTROYING AGENTS and the like, emulsifiable in water.—Deutsche Hydrierwerke, A.-G. Dec. 21, 1935. 35118/36.

### Specifications Accepted with Date of Application

PROCESSES OF REMOVING WATER FROM AQUEOUS AILPHATIC ACIDS. Kodak, Ltd. (Eastman Kodak Co.). Sept. 12, 1935. 467,481.

MANUFACTURE OF UNSATURATED DIKETONES related to the corpus luteum hormone.—Schering-Kahlbaum, A.-G. Sept. 12, 1935. 467,482.

RECOVERY OF TANTALUM AND NIOBIUM.—W. W. Triggs (Soc. Generale Metallurgique de Hoboken). Sept. 13, 1935. 467,483.

RECOVERY OF TANTALUM AND NIOBIUM.—W. W. Triggs (Soc. Generale Metallurgique de Hoboken). Sept. 13, 1935. 467,484.

PROCESS OF AND APPARATUS FOR THE PRODUCTION OF MAGNESIUM. I. G. Farbenindustrie. Feb. 12, 1935. 467,336.

CONDENSATION PRODUCTS OF METHACRYLAMIDE and formaldehyde.—F. B. Dehn (Rohm and Haas, A.-G.). Nov. 11, 1935. 467,492.

METHOD OF DISTILLING COAL and other carbonaceous material. J. S. Morgan. Nov. 12, 1935. 467,493.

MANUFACTURE AND PRODUCTION OF CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) Dec. 16, 1935. 467,571.

MANUFACTURE OF SPINTERLESS GLASS.—I. G. Farbenindustrie. Dec. 14, 1934. 467,428.

MANUFACTURE OF ESTERS OF methacrylic acid.—Rohm and Haas, A.-G. Dec. 14, 1934. 467,433.

PLASTIC BODIES CONTAINING OLEFINE POLYSULPHIDES.—W. W. Duecker, and C. R. Payne. Dec. 16, 1935. 467,576.

ELECTROLYTIC PRODUCTION OF MAGNESIUM.—W. H. A. Thiemann (I. G. Farbenindustrie.) Dec. 16, 1935. 467,440.

REMOVAL OF GASEOUS WEAK ACIDS from gases containing the same.—I. G. Farbenindustrie. Dec. 17, 1935. 467,579.

MANUFACTURE AND APPLICATION OF A PLASTICISING AGENT for cellulose derivatives.—Howards and Sons, Ltd., and R. H. Lock. Dec. 17, 1935. 467,510.

PURIFICATION OF GASES AND LIQUIDS from carbon disulphide.—Robinson Bros., Ltd., D. W. Parkes, and C. D. Mitchell. Dec. 18, 1935. 467,581.

PROCESS FOR THE MANUFACTURE OF MONOAZO-DYESTUFFS of the pyrazolone series.—A. Carpmal (I. G. Farbenindustrie.) Dec. 20, 1935. 467,602.

APPARATUS FOR THE REGENERATION OF ALKALINE WASHING LIQUIDS laden with hydrogen sulphide.—G. W. Johnson (I. G. Farbenindustrie.) Dec. 21, 1935. 467,644.

MANUFACTURE OF DYESTUFFS of the anthracene series.—W. W. Groves (I. G. Farbenindustrie.) Dec. 24, 1935. 467,650.

MANUFACTURE OF 4-HYDROXYNAPHTHOXYL and its substitution products.—A. Carpmal (I. G. FaErbenindustrie.) Dec. 24, 1935. 467,274.

FRACTIONAL CONDENSATION AND/OR DISTILLATION OF HYDROCARBON OILS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Jan. 4, 1935. 467,617.

CRACKING AND COKING HYDROCARBON OILS.—Universal Oil Products Co. May 16, 1935. 467,368.

PRODUCTION OF SULPHUR TRIOXIDE.—W. Busching. June 19, 1935. 467,298.

PRODUCTION OF PECTIN COMPOSITION.—C. G. Spalding, and G. R. Gould. June 2, 1936. 467,370.

PROCESS FOR THE MANUFACTURE OF UNSATURATED NEUTRAL OXIDATION PRODUCTS OF stigmasterol compounds.—Schering-Kahlbaum, A.-G. July 13, 1935. 467,376.

CATALYSTS.—J. L. De Roos. Aug. 1, 1935. 467,381.

MANUFACTURE OF MAGNESIUM HYDROXIDE.—L. Mellersh-Jackson. (Marine Chemicals Co., Ltd.). Oct. 21, 1936. 467,543.

MANUFACTURE OF CONDENSATION PRODUCTS OF THE DIPHENYLAMINE series.—I. G. Farbenindustrie. Nov. 28, 1935. 467,549.

CATALYTIC DEHYDROGENATION OF ALIPHATIC HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 9, 1935. 467,470.

TREATMENT OF OXIDATION PRODUCTS OF aliphatic hydrocarbons. Henkel and Cie, Ges. March 2, 1936. 467,528.

MANUFACTURE AND USE OF INTERPOLYMERS OF methacrylic acid amide.—F. B. Dehn (Rohm and Haas, A.-G.). Nov. 11, 1935. 467,402.

PROCESSES OF REMOVING WATER FROM AQUEOUS ALIPHATIC ACIDS. Kodak, Ltd. (Eastman Kodak Co.). Sept. 12, 1935. 467,559.

### Applications for Patents

UREA DERIVATIVES.—Imperial Chemical Industries, Ltd., and H. A. Piggott. 16313.

QUATERNARY AMMONIUM COMPOUNDS.—Imperial Chemical Industries, Ltd. 16314.

TREATMENT OF TEXTILES.—Imperial Chemical Industries, Ltd., and B. P. Ridge. 16798, 16799, 16800.

PRODUCTION OF MOLYBDENUM.—International Hydrogenation Patents Co., Ltd. (Germany, June 27, '36.) 16535.

MANUFACTURE OF AZO DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 16144.

APPARATUS FOR HEATING UP CARBONACEOUS SUBSTANCES.—G. W. Johnson (I. G. Farbenindustrie.) 16247.

SEPARATION OF POLYGLYCOL ETHERS from mixtures containing same.—G. W. Johnson (I. G. Farbenindustrie.) 16457.

CONVERSION OF OLEFINS INTO high molecular weight products. G. W. Johnson (I. G. Farbenindustrie.) 16458.

CONVERSION OF ACETYLENE LINKAGE INTO AN ETHYLENE LINKAGE. G. W. Johnson (I. G. Farbenindustrie.) 16777.

PRODUCTION OF CHLORINE DIOXIDE.—Mathieson Alkali Works. (United States, June 17, '36.) 16422.

MANUFACTURE OF HYDROGEN PEROXIDE.—Mathieson Alkali Works. (United States, June 25, '36.) 16551.

MANUFACTURE OF PEROXIDES.—Mathieson Alkali Works. (United States, June 25, '36.) 16552.

LOW-TEMPERATURE CARBONISATION OF FUELS.—Metallges., A.-G. (Germany, July 4, '36.) 16110.

CATALYTIC TREATMENT OF MOTOR FUEL.—A. L. Mond. (Universal Oil Products Co.). 16793, 16794.

EXTRACTION OF ALKALI HYDROXIDES, ETC., from alkali, etc., silicas.—R. S. Opatowski. (Italy, June 12, '36.) 16506.

PRODUCTION OF ALUMINIUM CHLORIDE.—Ruhchemie, A.-G. (Germany, June 22, '36.) 16350.

MANUFACTURE OF THERAPEUTICALLY VALUABLE COMPOUNDS.—Schering-Kahlbaum, A.-G. (Germany, June 15, '36.) 16618.

MANUFACTURE OF STABILISED HYDROCARBON POLYMERS.—Standard Oil Development Co. (United States, July 25, '36.) 16136.

MANUFACTURE OF BUTADIENE.—Standard Oil Development Co. (United States, July 15, '36.) 16702.

COMBUSTION APPARATUS combined with thermostatically-controlled draught-regulating means.—Svenska Aktiebolaget Gasaccumulator. (Sweden, June 22, '36.) 16705.

COMBUSTION APPARATUS combined with thermostatically-controlled draught-regulating means.—Svenska Aktiebolaget Gasaccumulator. (Sweden, Sept. 29, '36.) 16706.

COMBUSTION APPARATUS combined with thermostatically-controlled draught-regulating means.—Svenska Aktiebolaget Gasaccumulator. (Sweden, Oct. 7, '36.) 16707.

ALUMINUM ALLOYS.—W. H. A. Thiemann (I. G. Farbenindustrie.) Dec. 16, '35. 16548.

PROCESSES FOR MAKING CADMIUM-RED.—United Color and Pigment Co., Inc. (United States, July 9, '36.) 16617.

CHEMICAL, ETC., RECOVERY APPARATUS for treating waste liquor. Babcock and Wilcox, Ltd. (United States, Aug. 22, '36.) 16931.

PRODUCTION OF ALCOHOLS OF THE cyclopentanopolymethylenethrene series.—A. G. Bloxam (Soc. of Chemical Industry in Basle). 16868.

APPARATUS FOR CARBONISATION PROCESSES.—H. A. Brassert and Co., Ltd., and F. Pruening. 17042.

PROCESS FOR OBTAINING PURE COMPOUNDS OF sulphate of aluminium, etc.—S. Bretznajder. (Poland, June 18, '36.) 17069.

2-HYDROXYMETHYL-1, 3-DIOXOLANE.—Carbide and Carbon Chemicals Corporation. (United States, July 1, '36.) 17426.

PRODUCTION OF 2-P-DIOXANONE.—Carbide and Carbon Chemicals Corporation. (United States, July 1, '36.) 17427.

MANUFACTURE OF PLASTIC COMPOSITIONS.—Carbide and Carbon Chemicals Corporation. (United States, July 1, '36.) 17428.

MANUFACTURE OF AZO DYESTUFFS.—A. Carpmal (I. G. Farbenindustrie.) 17029, 17158.

MANUFACTURE OF ARALKYLETHERS OF high molecular carbohydrates.—A. Carpmal (I. G. Farbenindustrie.) 17484.

MANUFACTURE OF PHARMACEUTICAL, ETC., AGENTS.—Deutsche Hydrierwerke, A.-G. (Germany, June 20, '36.) 17257.

PRODUCTION OF DISAZO DYESTUFFS.—Compagnie Nationale de Matieres Colorante et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. (France, June 30, '36.) 16958.

PRODUCTION OF DISAZO DYESTUFFS.—Compagnie Nationale de Matieres Colorante et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. (France, Nov. 10, '36.) 16959.

METHOD OF COOLING HYDROCARBON OILS.—Edeleanu-Ges. (Germany, June 20, '36.) 16873.

LOW-TEMPERATURE EXTRACTION OF LIGHT HYDROCARBON MIXTURES. Edeleanu-Ges. (Germany, July 8, '36.) 17037.

REFINING OF HYDROCARBON OILS.—Edeleanu-Ges. (Germany, June 23, '36.) 17350.

MANUFACTURE OF CHLORINATED NAPHTHALENE DERIVATIVES.—D. A. W. Fairweather, and Imperial Chemical Industries, Ltd. 17524.

APPLICATION OF HALOGENATED VINYL POLYMERIDES in the plastic art.—W. W. Groves (Deutsche Celluloid-Fabrik). 17139.

MANUFACTURE OF SUBSTITUTED BENZENECARBOXYLIC ACIDS.—W. W. Groves (Deutsche Celluloid-Fabrik). 16896.

MANUFACTURE OF VAT-DYESTUFFS OF THE dibenzpyrenequinone series.—W. W. Groves (Deutsche Celluloid-Fabrik). 17348.

PRODUCTION OF FAST DYEINGS.—W. W. Groves (Deutsche Celluloid-Fabrik). 17352.

PURIFICATION OF COMBUSTION GASES.—D. M. Henshaw, and W. C. Holmes and Co., Ltd. 17423.

PRODUCTION OF MORDANT DYEINGS ON COTTON.—I. G. Farbenindustrie. (Germany, June 18, '36.) 17067.

MANUFACTURE OF AROMATIC COMPOUNDS.—I. G. Farbenindustrie. (Germany, June 23, '36.) 17349.

MANUFACTURE OF 2-ALKYL-TETRAHYDROBENZOTHAZOLES and 2-alkyl-tetrahydrobenzoselethiazoles.—I. G. Farbenindustrie. (Germany, July 29, '36.) 17351.

NITROGEN-CONTAINING ORGANIC COMPOUNDS.—Imperial Chemical Industries, Ltd., R. J. W. Reynolds, J. D. Rose, H. D. Piggott, and E. E. Walker. 16915, 17054.

MANUFACTURE OF DYESTUFFS OF THE phthalocyanine series.—G. W. Johnson (I. G. Farbenindustrie.) 17064, 17065.

DYEING, ETC., OF CELLULOSE ESTERS, ETC.—G. W. Johnson (I. G. Farbenindustrie.) 17115.

MANUFACTURE OF L-AMINO-2-NITRO-ANTHRAQUINONE.—G. W. Johnson (I. G. Farbenindustrie.) 17116.

DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 17066.

MANUFACTURE OF LIQUID HYDROCARBONS from gases containing olefines.—G. W. Johnson (I. G. Farbenindustrie.) 17249, 17250.

MANUFACTURE OF VULCANISABLE MIXTURES OF organic film-forming substances.—G. W. Johnson (I. G. Farbenindustrie.) 17251.

PRODUCTION OF A MEDICAMENT from the latex of *lactuca virosa*. Knoll, A.-G., Chemische Fabriken. (Germany, June 23, '36.) 17256.

TREATMENT OF CELLULOSE ESTERS.—Kodak, Ltd. (United States, July 3, '36.) 17109.

PRODUCTION OF GASES for the heat-treatment of metals.—A. G. Lobley. 17097.

MANUFACTURE OF CHEMICALS.—Mathieson Alkali Works. (United States, June 25, '36.) 17464.

PRODUCTION OF HYDROCARBONS.—V. Meiner, and F. Rostler. 17009.

MANUFACTURE OF NITROGEN CHLORIDE, ETC.—Naamlooze Vennootschap Industriële Maatschappij voorheen Noury and van der Lande. (Holland, June 30, '36.) 17380.

OBTAINING A GAS COMPARATIVELY RICH IN KRYPTON.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. (Germany, June 25, '36.) 17377.

PROCESS OF SEPARATING LOWER ALKYLAMINES.—L. N. Reddie (Girdler Corporation). 16927, 16928.

MANUFACTURE OF PYRIMIDINE THIAZOLIUM COMPOUNDS.—Research Corporation. (United States, Aug. 5, '36.) 16936.

MANUFACTURE OF PYRIMIDINE THIAZOLIUM COMPOUNDS.—Research Corporation. (June 2, ) (United States, April 1, ) 16937.

CATALYTIC CONVERSION OF OXIDES OF CARBON.—Ruhchemie, A.-G. (Germany, July 3, '36.) 17027.

MANUFACTURE OF ACIDS OF THE cyclopentano-polyhydrophenanthrene series.—Schering-Kahlbaum, A.-G. (United States, June 22, '36.) 17366.

PROCESS FOR OBTAINING BERYLLIUM FLUORIDE free from oxide.—Seri-Holding Soc. Anon. (Italy, June 15, '36.) 17159.

PRODUCTION OF INSOLUBLE AZO-DYESTUFFS, ETC.—W. A. Sexton, Imperial Chemical Industries, Ltd., and M. A. T. Rogers. 17525.

MANUFACTURE OF POLYAZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. (Switzerland, June 17, '36.) 16869.

PROCESS FOR COLOURING TEXTILES.—Soc. of Chemical Industry in Basle. (Switzerland, June 25, '36.) 16872.

MANUFACTURE OF COMPLEX METAL COMPOUNDS OF polyazo-dyestuffs.—Soc. of Chemical Industry in Basle. (Switzerland, June 17, '36.) 16870.

MANUFACTURE OF COMPLEX METAL COMPOUNDS OF polyazo-dyestuffs.—Soc. of Chemical Industry in Basle. (Switzerland, June 16, ) 16871.

DEHYDROGENATION PRODUCTS from hetero-cyclic bases.—Soc. of Chemical Industry in Basle. (Switzerland, June 20, '36.) 17212.

DEHYDROGENATION PRODUCTS from hetero-cyclic bases.—Soc. of Chemical Industry in Basle. (Switzerland, June 19, ) 17213.

## Weekly Prices of British Chemical Products

THERE are no price changes to report this week in the London market for chemical products. Unless otherwise stated, the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—Conditions generally on the Manchester chemical market during the past week have been fairly satisfactory. With firm price conditions ruling in most sections Lancashire consumers of chemical products have not hesitated to cover requirements over the second half of the year and the majority of the leading buyers are probably well placed in this respect. Business at the consuming end in most branches continues fairly active and deliveries of the leading heavy chemicals during the past week against contracts have been steady, although the position is likely to be seasonally affected as the Lancashire industrial holidays get into full swing. With regard to the by-products market the principal feature has been a further sharp advance in prices of both crude and crystal carbolic in consequence of the shortage of supplies relative to the demand.

### General Chemicals

ACETONE.—£45 to £47 per ton.  
ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £30 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.  
ACID, BORIC.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.  
ACID, CHROMIC.—9½d. per lb., less 2½%; d/d U.K.  
ACID, CITRIC.—1s. per lb. MANCHESTER: 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%, ex store.  
ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.  
ACID, HYDROCHLORIC.—Spot, 5s. to 7s. 6d. carboy d/d according to purity, strength and locality.  
ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.  
ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works.  
ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 10s. to £55 per ton ex store.  
ACID, SULPHURIC.—168° Tw., £4 5s. to £4 15s. per ton; 140° Tw., arsenic-free, £2 15s. to £3 5s.; 140° Tw., arsenious, £2 10s.  
ACID, TARTARIC.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb.  
ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.  
ALUMINIUM SULPHATE.—£7 per ton d/d Lanes.; GLASGOW: £7 to £8 ex store.  
AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.  
AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.  
AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.  
AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.  
AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £16 10s. (See also Salammuniac.)  
AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammuniac.)  
ANTIMONY OXIDE.—£55 10s. per ton.  
ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish, £17, ex store.  
RARIUM CHLORIDE.—£10 per ton. GLASGOW: £11 5s. per ton.  
BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.  
BLEACHING POWDER.—Spot, 35/37%. £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.  
BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.  
CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. GLASGOW: 70/75% solid, £5 10s. per ton net ex store.  
CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d  
CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. GLASGOW: 99%, £4 7s. per cwt. in 5-cwt. casks.  
FORMALDEHYDE.—£22 10s. per ton.  
GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £5 7s. 6d. to £6 7s. 6d. per cwt. according to quantity; in drums, £5 to £5 13s. 6d.

GLASGOW.—There has been a steady day to day demand for chemicals for home trade during the week, but export business still remains quiet. Prices generally continue firm at about previous figures, the only important changes during the week being an advance of £1 per ton in the price of red and white leads and litharge, on account of the increased price of the metal. There has been a somewhat quieter week for coal tar by-products, although prices of materials are well maintained. Practically no fresh bookings of cresylic acid are reported, and transactions in carbolic appear to be hampered by lack of supplies. High boiling acid continues to command some interest round 2s. 6d. per gallon. Creosote is steady. Quotations for crude benzol show an appreciation in value at 10½d. to 10¾d. per gallon f.o.r. buyers' tank wagons, while on the other hand, motor benzols have been sold at ¾d. less per gallon than last reported. Available fresh supplies of pyridine find a ready enough outlet at prices indicated.

IODINE.—Resublimed B.P., 5s. 1d. per lb.  
LEAD ACETATE.—LONDON: White, £35 10s. per ton; brown, £35.  
GLASGOW: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £36; brown, £35 10s.  
LEAD NITRATE.—£39 per ton.  
LEAD, RED.—SCOTLAND: £36 per ton, less 2½%, carriage paid for 2-ton lots.  
LEAD (WHITE SUGAR OF).—GLASGOW: £37 per ton net, ex store.  
LITHARGE.—SCOTLAND: Ground, £36 per ton, less 2½%, carriage paid for 2-ton lots.  
MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.  
MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.  
MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.  
MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d. per lb.; powder B.P., 6s. 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra.  
METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.  
PARAFFIN WAX.—SCOTLAND: 3½d. per lb.  
PHENOL.—7½d. to 8½d. per lb.  
POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39 10s.  
POTASSIUM BICHROMATE.—SCOTLAND: 5d. per lb., net, carriage paid.  
POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £38 per ton.  
POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.  
POTASSIUM NITRATE.—£27 per ton. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.  
POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. Crystals, 9½d. MANCHESTER: B.P. 10½d. to 1s.  
POTASSIUM PRUSSATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d. to 6¾d.  
SALAMMUNIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. GLASGOW: Large crystals, in casks, £37.  
SALT CAKE.—Unground, spot, £3 16s. 6d. per ton.  
SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.  
SODA, CAUSTIC.—Solid, 76/77° spot, £12 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less.  
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.  
SODIUM ACETATE.—£18 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.  
SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. GLASGOW: £12 15s. per ton in 1 cwt. kegs, £11 per ton in 2-cwt. bags. MANCHESTER: £10 10s.  
SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. MANCHESTER: 4d. per lb. GLASGOW: 4d., net, carriage paid.  
SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.  
SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags.  
SODIUM CHLORATE.—£26 10s. to £30 per ton. GLASGOW: £1 10s. per cwt.  
SODIUM CHROMATE.—4d. per lb. d/d U.K.  
SODIUM HYPOSULPHATE.—Commercial, 2 ton lots d/d, £10 5s. per ton; photographic, £14 5s. MANCHESTER: Commercial, £10; photographic, £14 10s.

**SODIUM METASILICATE.**—£14 per ton, d/d U.K. in cwt. bags.  
**SODIUM NITRATE.**—Refined, £7 15s. per ton for 6-ton lots d/d.  
**SODIUM NITRITE.**—£18 5s. per ton for ton lots.  
**SODIUM PERBORATE.**—10%, 9½d. per lb. d/d in 1-cwt. drums.  
**SODIUM PHOSPHATE.**—£13 per ton.  
**SODIUM PRUSSIAN.**—4d. per lb. for ton lots. GLASGOW: 5d. to 5½d. ex store. MANCHESTER: 4d. to 4½d.  
**SODIUM SILICATE.**—£9 10s. per ton.  
**SODIUM SULPHATE (GLAUBER SALTS).**—£3 per ton d/d.  
**SODIUM SULPHATE (SALT CAKE).**—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 10s. to £3 15s.  
**SODIUM SULPHIDE.**—Solid 60/62%, Spot, £11 5s. per ton d/d in drums; crystals 30/32%, £8 15s. per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.  
**SODIUM SULPHITE.**—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.  
**SULPHATE OF COPPER.**—£20 per ton, less 2%, in casks. MANCHESTER: £22 per ton f.o.b. SCOTLAND: £24 per ton less 5%, Liverpool, in casks.  
**SULPHUR PRECIP.**—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.  
**ZINC SULPHATE.**—Crystals, £9 per ton, f.o.r., in bags.

### Rubber Chemicals

**ANTIMONY SULPHIDE.**—Golden, 6½d. to 1s. 1d. per lb., according to quality. Crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.  
**ARSENIC SULPHIDE.**—Yellow, 1s. 5d. to 1s. 7d. per lb.  
**BARYTES.**—£6 to £7 10s. per ton, according to quality  
**CADMIUM SULPHIDE.**—7s. 7d. to 8s. per lb.  
**CARBON BISULPHIDE.**—£31 to £33 per ton, according to quantity, drums extra.  
**CARBON BLACK.**—3 11/16d. to 4 13/16d. per lb., ex wharf.  
**CARBON TETRACHLORIDE.**—£41 to £46 per ton, according to quantity, drums extra.  
**CHROMIUM OXIDE.**—Green, 1s. 2d. per lb.  
**DIPHENYL GUANIDINE.**—2s. 2d. per lb.  
**INDIA-RUBBER SUBSTITUTES.**—White, 4½d. to 5d. per lb.; dark, 3½d. to 4½d. per lb.  
**LAMP BLACK.**—£22 to £23 per ton d/d London; vegetable black, £28 to £48.  
**LEAD HYPOSULPHITE.**—9d. per lb.  
**LITHOPONE.**—30%, £16 10s. to £17 5s. per ton.  
**SULPHUR.**—£9 to £9 5s. per ton. **SULPHUR PRECIP. B.P.**, £55 to £60 per ton. **SULPHUR PRECIP. COMM.**, £50 to £55 per ton.  
**SULPHUR CHLORIDE.**—5d. to 7d. per lb., according to quantity.  
**VERMILION.**—Pale, or deep, 5s. 3d. per lb., 1-cwt. lots.  
**ZINC SULPHIDE.**—10d. to 11d. per lb., according to quality.

### Nitrogen Fertilisers

**SULPHATE OF AMMONIA.**—Neutral quality, basis 20.6 per cent. nitrogen, delivered in 6-ton lots to farmer's nearest station, £7 5s. per ton.  
**CALCIUM CYANAMIDE.**—£7 5s. per ton, carriage paid to any railway station in Great Britain in lots of four tons and over.  
**NITRO-CHALK.**—£7 5s. per ton for delivery to end of July.  
**NITRATE OF SODA.**—£7 12s. 6d. per ton for delivery up to end of July.  
**CONCENTRATED COMPLETE FERTILISERS.**—£10 12s. to £11 1s. per ton delivered in 6-ton lots to farmer's nearest station.  
**AMMONIUM PHOSPHATE FERTILISERS.**—£10 5s. to £13 15s. per ton for delivery up to end of July, delivered in 6-ton lots to farmer's nearest station.

### Coal Tar Products

**ACID, CRESYLIC.**—97/99%, 5s. 3d. to 5s. 6d. per gal.; 99/100%, 5s. to 6s., according to specification; pale 99%, 5s. 6d. to 5s. 8d.; dark, 4s. 8d. to 4s. 10d. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale 97/99%, 4s. 6d. to 4s. 10d.; dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. 4d. to 2s. 8d. American specification, 4s. 3d. to 4s. 6d. MANCHESTER: Pale, 99/100%, 5s. 3d.  
**ACID, CARBOLIC.**—Crystals, 7½d. to 8½d. per lb.; crude, 60's, 4s. 3d. to 4s. 6d. per gal. MANCHESTER: Crystals, 9½d. to 10d. per lb. f.o.b. in drums; crude, 4s. 3d. per gal. GLASGOW: Crude, 60's, 4s. to 4s. 2d. per gal.; distilled, 60's, 4s. 4d. to 4s. 8d.  
**BENZOL.**—At works, crude, 10d. to 10½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4½d. to 1s. 5d.; pure, 1s. 8½d. to 1s. 9d. GLASGOW: Crude, 10½d. to 11½d. per gal.; motor, 1s. 4½d. to 1s. 5d.  
**CREOSOTE.**—B.S.I. Specification standard, 6d. per gal. f.o.r. Home, 3½d. d/d. LONDON: 4½d. f.o.r. North: 5d. London. MANCHESTER: 5½d. to 6½d. GLASGOW: B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5½d. to 5½c.  
**NAPHTHA.**—Solvent, 90/160%, 1s. 7d. to 1s. 8d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 90/190%, 1s. 2d. to 1s. 3d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW: Crude, 6d. to 6½d. per gal.; 90% 160, 1s. 6½d. to 1s. 7½d., 90% 190, 1s. 1d. to 1s. 2d.

**NAPHTHALENE.**—Crude, whizzed or hot pressed, £10 10s. to £11 10s. per ton; purified crystals, £18 to £20 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £22 per ton f.o.b.  
**PYRIDINE.**—90/140%, 9s. to 9s. 6d. per gal.; 90/180, 2s. 9d. to 3s. 6d. GLASGOW: 90% 140, 9s. to 10s. per gal.; 90% 160, 7s. to 8s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 9s. to 10s. at works  
**TOLUOLE.**—90%, 2s. 1d. per gal.; pure, 2s. 6d. to 2s. 7d. GLASGOW: 90%, 120, 1s. 10d. to 1s. 11d. per gal.  
**PITCH.**—Medium, soft, 36s. to 37s. per ton, in bulk at makers' works. MANCHESTER: 36s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 32s. to 37s. per ton; in bulk for home trade, 32s. 6d.  
**XYLOL.**—Commercial, 2s. 3d. per gal.; pure, 2s. 5d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

### Wood Distillation Products

**ACETATE OF LIME.**—Brown, £8 5s. to £8 15s. per ton; grey, £10 10s. to £11 10s. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.  
**CHARCOAL.**—£6 5s. to £12 per ton, according to grade and locality.  
**METHYL ACETONE.**—40-50%, £42 to £45 per ton.  
**WOOD CREOSOTE.**—Unrefined 6d. to 1s. per gal., according to boiling range.  
**WOOD, NAPHTHA, MISCIBLE.**—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.  
**WOOD TAR.**—£3 to £4 per ton.

### Intermediates and Dyes

**ACID, BENZOIC, 1914 B.P. (ex toluol).**—1s. 9½d. per lb. d/d buyer's works.  
**ACID, GAMMA.**—Spot, 4s. per lb. 100% d/d buyer's works.  
**ACID, H.**—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.  
**ACID NAPHTHIONIC.**—1s. 8d. per lb.  
**ACID, NEVILLE AND WINTHER.**—Spot, 3s. per lb. 100%.  
**ACID, SULPHANILIC.**—Spot, 8d. per lb. 100%, d/d buyer's works.  
**ANILINE OIL.**—Spot, 8d. per lb., drums extra, d/d buyer's works.  
**ANILINE SALTS.**—Spot, 8d. per lb. d/d buyer's works, casks free.  
**BENZIDINE, HCl.**—2s. 5d. per lb., 100% as base, in casks.  
**m-CRESOL 98/100%.**—1s. 8d. to 1s. 9d. per lb. in ton lots.  
**o-CRESOL 30/31° C.**—6½d. to 7½d. per lb. in 1-ton lots.  
**p-CRESOL 34-5° C.**—1s. 7d. to 1s. 8d. per lb. in ton lots.  
**DICHLORANILINE.**—1s. 11½d. to 2s. 3d. per lb.  
**DIMETHYLANILINE.**—Spot, 1s. 6d. per lb., package extra.  
**DINITROBENZENE.**—7½d. per lb.  
**DINITROCHLOROBENZENE, SOLID.**—£72 per ton.  
**DINITROTOLUENE.**—48/50° C., 8½d. per lb.; 66/68° C., 10d.  
**DIPHENYLAMINE.**—Spot, 2s. per lb., d/d buyer's works.  
**α-NAPHTHOL.**—Spot, 2s. 4d. per lb., d/d buyer's works.  
**β-NAPHTHOL.**—9½d. to 9½d. per lb.; flake, 9½d. to 9½d.  
**α-NAPHTHYLAMINE.**—Lumps, 1s. per lb.; ground, 1s. 0½d. in casks.  
**β-NAPHTHYLAMINE.**—Spot, 2s. 9d. per lb., d/d buyer's works in casks.  
**o-NITRANILINE.**—3s. 11d. per lb.  
**m-NITRANILINE.**—Spot, 2s. 7d. per lb., d/d buyer's works.  
**p-NITRANILINE.**—Spot, 1s. 8d. to 2s. 1d. per lb. d/d buyer's works.  
**NITROBENZENE.**—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.  
**NITRONAPHTHALENE.**—9d. per lb.; P.G., 1s. 0½d. per lb.  
**SODIUM NAPHTHIONATE.**—Spot, 1s. 9d. per lb., 100% d/d buyer's works.  
**o-TOLUIDINE.**—10½d. per lb., in 8/10-cwt. drums, drums extra.  
**p-TOLUIDINE.**—1s. 10½d. per lb., in casks.  
**m-XYLIDINE ACETATE.**—4s. 3d. per lb., 100%.

### Latest Oil Prices

LONDON, June 30.—LINSEED OIL was quiet. Spot, £32 5s. per ton (small quantities); July and Aug., £29 15s.; Sept.-Dec., £29 12s. 6d.; Jan.-April, £29 15s., naked. SOYA BEAN OIL was steady. Oriental (bulk) afloat, Rotterdam, £24 5s. per ton. RAPE OIL was steady. Crude, extracted, £36 per ton; technical refined, £37, naked, ex wharf. COTTON OIL was steady. Egyptian crude, £27 per ton; refined common edible, £30; deodorised, £32, naked, ex mill (small lots £1 10s. extra). TURPENTINE was easy. American, spot, 37s. per cwt. HULL.—LINSEED OIL, spot, quoted £30 5s. per ton; June, July, Aug., Sept.-Dec. and Jan.-April, £29 15s. COTTON OIL, Egyptian, crude, spot, £27; edible, refined, spot, £30; technical, spot, £30; deodorised, £32, naked. PALM KERNEL OIL, crude, f.m.q., spot, £25, naked. GROUNDNUT OIL, extracted, spot, £31 10s.; deodorised, £34 10s. RAPE OIL, extracted, spot, £35; refined, £36. SOYA OIL, extracted, spot, £31 10s.; deodorised, £34 10s. per ton. COD OIL f.o.r. or f.a.s. 27s. 6d. per cwt., in barrels. CASTOR OIL, pharmaceutical, 44s.; first, 39s.; second, 37s. TURPENTINE, American, spot, 38s. 9d. per cwt.

## From Week to Week

SANITARY DRY LIME CO. (LIVERPOOL), LTD., changed their name to S. D. L., Ltd., on June 16, 1937.

THE THREE RECENTLY INTRODUCED PLASTICISERS for cellulose acetate described on page 571 of THE CHEMICAL AGE last week, are produced by J. M. Steel and Co., Ltd.

THE NOMINAL CAPITAL of the Yorkshire Dyeware and Chemical Co., Ltd., has been increased by the addition of £50,000 in £1 ordinary shares beyond the registered capital of £200,000.

THE NOMINAL CAPITAL of Hedley Price, Ltd., has been increased by the addition of £3,000 in £1 ordinary shares beyond the registered capital of £2,000.

THE DEATH ROLL in the explosion at the Nobel Factory at Ardeer has been increased to four by the death in the Western Infirmary, Glasgow, on June 24, of Mr. James McNay, of Ardrossan.

THE NEW RAYON FACTORY of the Ducilo Co. (a subsidiary of Duperial Co., which, in its turn, is a subsidiary of Imperial Chemical Industries and Dupont de Nemours), was recently inaugurated in the Argentine in the presence of the president and members of the Cabinet. The factory is near Quilmes and its erection has cost about 34,000,000 pesos.

THE LAUTARO NITRATE CO., LTD., announces that an interim payment on account of interest will be made on June 30, on the first mortgage income debenture and the first mortgage (Antofagasta) income debenture stocks. This is in accordance with the scheme of arrangement of November last. For 1936, 3 per cent. was paid on these stocks. There is £863,337 first mortgage income debentures outstanding, and £883,348 of the first mortgage (Antofagasta) debentures.

THE MANAGERS OF FOREIGN OIL COMPANIES at Smyrna, including one Englishman, were detained on June 26, after the companies had suspended sales. The companies had taken this action rather than accept a price reduction which had been fixed by the authorities. It is understood the managers were subsequently released provisionally pending their trial. The Government ordered the sale of oils at 33 per cent. below former prices. The municipalities are making up stocks, and creating retail sales centres throughout the country in order to avert a stoppage of the means of transport pending the trial of the managers.

THE BOARD OF TRADE has received an application under Section 5 (5) of the Finance Act, 1936, for a licence to import free of duty an apparatus suitable for measuring and recording the proportion of solvent vapour in a mixture thereof with air, wherein the measurement is based on a comparison of the combined effects of viscosity and density in the case of the mixture and of air. Any representations that similar apparatus is made, or is likely to be made within a reasonable time in the United Kingdom or elsewhere in His Majesty's Dominions, should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, not later than July 16.

HOLIDAYS WITH PAY for chemical workers are being negotiated by the Scottish officials of the Transport and General Workers' Union with a number of firms. Six days' pay as a holiday bonus will be given to the employees of James Anderson's colour works, Florence Street, Glasgow, under an agreement which Mr. John Sullivan, Union organiser, has signed. Negotiations are to be continued for a permanent arrangement. The firm has also conceded an immediate increase of 4s. a week in wages. The Union has also reached an agreement with R. Young's Chemical Works, Granstonhill, Glasgow, for an increase of 2s. 6d. to men and 1s. 6d. to 4s. 6d. for women. The Union hopes to establish a national standard of wages and conditions for chemical workers.

NINETY PLAYERS TOOK PART in the Chemical Trade Golf Competition held on the Royal Liverpool Club's course on June 19, for the Sir John Brunner Challenge Cup, the John Rayner Memorial Cup, a scratch prize and prizes for four-ball foursomes against bogey. Colonel C. K. Potter presented the prizes at the dinner which followed. The Sir John Brunner Challenge Cup was won by Mr. J. Voelcker, with a gross score of 82 and net 70. The scratch prize was won by the runner-up, Mr. E. G. Tweedle, with a gross score of 76 and net 74. The Rayner Memorial Cup, played for by teams representing the chemical trade prior to 1926, was won by Synthetic Ammonia and Nitrates, average score all players 81.30; Brunner, Mond, 86.823; Castner Kellner, 87.481; The Rest, 91.10; United Alkali, 92.41. Four-ball foursomes against bogey for prizes presented by A. E. Peak and T. P. Norris resulted in a tie, A. H. Cowap and J. Voelcker and J. W. Gibb and T. Parker 5 up. The prizes were awarded to the latter, the sweepstakes being equally divided, J. Callon and A. Herbinson, E. O. Glover and W. M. Inman, and J. G. Paton and E. G. Williams being 3 up. The morning sweepstakes were won by J. Voelcker, E. G. Tweedle, and G. I. Carnegie.

THE TREASURY has made an Order under Section 10(5) of the Finance Act, 1926, exempting phenol (synthetic), acid carbo-lic (synthetic); benzophenol (synthetic) from Key Industry Duty from July 7, until December 31, 1937. The Treasury Order will shortly be published by the Stationery Office.

THE MANUFACTURE OF CHROME LEATHER is to be established at the State-aided Treforest Trading Estate in South Wales. A 40,000 ft. factory is to be erected by October, and will be in full operation by the New Year. It is being started by the Treforest Chrome Leather Works, Ltd., the directors of which are Mr. H. M. Oestreicher, a well-known German manufacturer, who will personally control the undertaking, Mr. S. K. Kohnstamm and Mr. Herbert G. Williams, M.P. About one hundred persons will be employed.

THE INTERNATIONAL SUGAR AGREEMENT, which was signed at the conclusion of the International Sugar Conference, on May 6, provides for the appointment of an International Sugar Council to be composed of delegates representing the contracting governments. Under the protocol to the agreement the contracting governments agree to appoint as soon as possible a provisional council to act prior to the coming into force of the agreement. The British Government has arranged for the session to begin on Monday, July 5, and has appointed as its representatives on the provisional council Lt.-Col. Francis Balfour, Sir Henry Fountain, and Mr. G. L. M. Clauson.

A DISPUTE CONCERNING UNION MEMBERSHIP has arisen at the new coke oven and by-product plants erected at Hebburn by John Bowes and Partners, Ltd., Durham colliery owners, which will be put into operation soon. It is stated that the management has decided not to employ men who are members of the National Union of Coke Men and By-Product Workers, but only those who are members of the Blastfurnace Men's and Iron Ore Miners' Union. The point at dispute is that in Durham it is the custom where colliery owners are also the owners of by-products plants for the men engaged at the latter to receive the same concessions as miners, i.e., free house and coal. This agreement was negotiated between the National Union of Coke Men and the Durham coalowners, but the Blast Furnace Men's Union which is in operation at plants unconnected with collieries at Cleveland and Consett has no negotiating powers with the colliery owners in Durham generally. In addition the National Union of Coke Men is affiliated to the Durham County Mining Federation Board, but the Blastfurnace Men's Union is not. It is alleged that men have already been brought from outside areas to start a branch of the Blastfurnace Men's Union. Mr. George Harvey, secretary of the Follonsby Miners' Lodge said last week all the pits in the group owned by Bowes and Partners were interested in the matter. Other grades of miners including mechanics and enginemen are involved and it is stated a meeting of the county organisations may be held at Durham if a satisfactory settlement is not brought about.

## Company News

**Zinc Corporation.**—A rise in net profits of £45,440, to £369,436, is reported for the year ended December 31 last.

**British Glues and Chemicals.**—Net profit for the year to April 30, after crediting £5,000 provided last year for specific purpose no longer required, but after placing £20,000 (£15,000) to reserve for contingencies including fluctuations in cost of raw materials and in selling prices, amounts to £89,026 (£86,841); add £35,307 brought in, making £124,333. A dividend of 10 per cent., less tax (7½ per cent.), has been declared on the ordinary shares.

## Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

**Portugal.**—A firm of commercial agents established at Oporto wishes to obtain the representation, on a commission and purchasing basis, of United Kingdom manufacturers of solvent naphtha, naphthalene, dinitrotoluene, borax, wood creosote, and aluminium powder, (Ref. No. 10.)

## Books Received

**Colloid Systems.** Edited by William Clayton, D.Sc., F.I.C., London: The Technical Press, Ltd. Pp. 311. 30s. net.

## Chemical and Allied Stocks and Shares

THE industrial and other sections of the Stock Exchange were reported to be rather more active this week, and despite the influence on sentiment of developments in connection with the French financial position, the general tendency has been to higher prices.

Boots Pure Drug have remained around 50s. 9d. Timothy Whites and Taylors lost 9d. to 32s. 3d., and Sangers were lower at 25s. 9d., awaiting full details of the proposed new issue of shares to shareholders on bonus terms. The full report of the latter company created an excellent impression.

Distillers continued active in advance of the dividend announcement, and Imperial Chemical at 37s. are the same as a week ago. British Plaster Board were firm at 38s. 7½d. following publication of the results showing a further advance in profits and the maintenance of the dividend at 50 per cent. on the larger capital in issue. Associated Portland Cement improved 7½d. to 91s. 3d., and Turner and Newall put on 3s. 1½d. to 93s. 1½d., it being anticipated in some quarters that the dividend is likely to be brought up to at least 26 per cent. General Refractories were steadier at 28s. 9d. aided by the belief that the interim dividend will be unchanged and that the interim progress report, due in a few weeks, is likely to indicate that fuller benefits are being derived from the expansion of the business. Borax Consolidated remained at 30s. at which an apparently satisfactory yield is offered on the basis of last year's 7½ per cent. dividend. The disposition in the market is still to budget for a larger dividend of possibly 9 per cent. and to hope that resumption of payment of an interim dividend may be announced in the autumn. Triplex Safety Glass fluctuated and have declined moderately to 65s. 7½d. at the time of writing. United Glass Bottle, Lancageave, Canning Town Glass and other glass shares were reported to be rather more active. British Glues and Chemicals were steady at 8s. The increased dividend created a favourable impression.

The directors are, however, following a rather more conservative policy than has been expected in the market, but in view of the rising trend in prices of materials and other factors it is perhaps hardly surprising they are again placing a large sum to reserves.

British Oil and Cake Mills preferred were little changed at 48s. 3d., and United Premier Oil and Cake remained around 9s. 3d. Barry and Staines were 6d. down at 43s. 6d., and Michael Nairn and Greenwich lost 7½d. to 68s. 1½d. Pinchin Johnson were little changed at 43s. it being realised that on the basis of last year's 20 per cent. dividend these 10s. shares give a not unsatisfactory yield, and that, despite the larger capital raising from the bonus, it continues to be assumed in the market that the dividend is likely to be at least maintained. British Oxygen were higher at 101s. 3d. Despite the larger capital the latter company is expected to be able to keep its dividend at 15 per cent. and to distribute a further bonus, as it is assumed that fuller benefits probably have yet to accrue from the expansion of the business.

Greiff-Chemicals Holdings 5s. ordinary units were active around 7s. 6d. The initial results issued in May covered a period of nearly seven months and a dividend at the rate of approximately 11½ per cent. per annum was paid. The subsidiary companies dealt conservatively with their profits, and it is possible a higher rate of dividend on the shares of the holdings company is in prospect. Monsanto Chemicals 5½ per cent. preference were again 22s. 6d., at which the yield offered seems attractive in view of the good cover for their dividend requirements.

Consett Iron, Stanton Ironworks, Borman Long and other prominent iron and steel shares made better prices. Richard Thomas were steady, awaiting the full results and meeting.

Oil shares were active, but the gains shown earlier in the week were not fully held.

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.)

COMPLYVENA (1937). LTD., drug manufacturers, etc. (M.S. 3/7/37.) June 19. £250 debenture, to F. P. Walker. St. Johns Wood; general charge.

THATCHER, PIKE AND CO., LTD., Shanklin, chemists. (M.S. 3/7/37.) June 18. £500 debenture, to Branch Nominees, Ltd.; general charge.

### Satisfactions

ANGLO-SCOTTISH PETROLEUM CO., LTD., London, S.E. (M.S., 3/7/37.) Satisfaction June 15, £500, registered November 4, 1936.

BENZOL AND BY-PRODUCTS, LTD., London, E.C. (M.S., 3/7/37.) Satisfaction June 11, of debenture registered November 26, 1928.

R. H. HYSLOP, LTD., Southport, chemists, etc. (M.S., 3/7/37.) Satisfaction June 22, £100, registered January 17, 1935.

THOMAS FELL AND CO., LTD., London, N.W., manufacturers of perfumes, etc. (M.S., 3/7/37.) Satisfaction June 16, £250, registered July 3, 1934.

## New Companies Registered

Carbo-Ice Industries, Limited.—Registered June 17. Nominal capital of £65,000. Manufacturers of carbon dioxide or its recovery from waste or flue gases or from any other gas or mixture of gases of which it forms a part as well as the production, manufacture and sale of by-products resulting from such manufacture, to engage in the manufacture of products of which carbon dioxide forms a component part and generally in any chemical manufacturing business which contemplates the production, manufacture and sale of chemical products, etc. Subscribers:—John G. Beevor and G. Sinclair Stevenson, of 18 Austin Friars, E.C.

Odris Products, Ltd., 281 Wood Lane, Dagenham.—Registered June 26. Nominal capital, £100. Manufacturing, research, dispensing and analytical chemists and druggists, etc. Directors: Harry Verney, Matthew C. Hendrie.

Compton Brothers (Glassworks), 1936, Ltd., 58 Hanover Street, Liverpool, L.—The nominal capital has been increased by the addition of £2,000 in £1 ordinary shares beyond the registered capital of £5,000.

Dox, Ltd., 5 Victoria Street, S.W.1.—Registered June 25. Nominal capital, £2,000. Professional and expert chemists, metallurgists and engineers, to engage in analytical research, experimental and development work, etc., and to adopt an agreement with Patent Retorts, Ltd., Davidson Retorts (British Rights), Ltd., T. M. Davidson and K. Cox. Directors: George G. Hay, John M. Flavell, Thomas M. Davidson.

Z-Ray Syndicate, Ltd., Gresham House, 24 Old Broad Street, E.C.2.—Registered June 29. Nominal capital £2,000. To adopt an agreement with Stanford Shottland, to turn to account the latter's patent and other rights therein referred to, and to carry on the business of radiologists, physicists, chemists and research workers in connection with all kinds of light and other rays, etc. Subscribers: John B. Martin, John J. Veasey.

E. P. Bray and Co., Ltd., 21 Broadwater Road, Welwyn Garden City.—Registered June 23. Nominal capital, £100. Manufacturers of and dealers in synthetic resin products and urea powders of all kinds, varnishes, enamels, lacquers, shellac, cellulose, size, pigments, compositions, oils, colours, wax and putty, manufacturing chemists, wood and iron workers, motor car body builders, enamellers and finishers, etc. Directors: Edward P. Bray, Geoffrey M. Toop.

Midland Allied Founders, Ltd., The Limerick Works, Meeting Street, Great Bridge, Tipton, Staffs.—Registered June 29. Nominal capital, £5,000. Manufacturers of and dealers in vitreous enamels, paints, colours, pigments, cements, varnishes, drugs, dyeware, compounds, porcelain, ceramic ware, and heating devices of all kinds, furnaces, oil and other burners, baths and sanitary ware, cooking stoves, axe boxes and railway fittings and die castings, metal workers, woodworkers, smelters, casters, stampers, piercers, etc. Subscribers: William A. Dawkins, Mrs. Eliza M. Dawkins, William A. Dawkins.

Plant Protection, Ltd., Nobel House, Buckingham Gate, S.W.1.—Registered June 25. Nominal capital, £1,900. To enter into an agreement with Imperial Chemical Industries, Ltd., and Cooper McDougall and Robertson, Ltd., for (inter alia) procuring co-operation between the two companies and their respective subsidiary and associated companies, and this company, in the manufacture and/or sale of plant pesticides and other horticultural products and in research relating to the production of such products, etc. Directors: John G. Nicholson, Wm. V. Blewett, Hugh D. Butchart, Wm. Gavin, Thomas A. Robertson, Leonard F. Braga, Percy R. Clarke, Norman D. Pagden.

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